MARINE AIR GROUND TASK FORCE
TRAINING COMMAND
TWENTYNINE PALMS, CALIFORNIA

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

Fiscal Years 2002-2006

Radian International
Sacramento, CA

Gene Stout and
Associates
Loveland, CO

Natural Resources and Environmental Affairs Division
Installations and Logistics Directorate

Marine Air Ground Task Force Training Command
Twentynine Palms, California

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT
Fiscal Years 2002-2006

Approval

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 USC 670a *et seq.*) as amended.

Joseph F. Weber
Brigadier General, U.S. Marine Corps
Commanding General
Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center
Twentynine Palms, California

OCT 15 2002
Date

Endorsement

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 USC 670a *et seq.*) as amended.

Mr. Curt Taucher, Regional Manager
Eastern Sierra and Inland Deserts Region
California Department of Fish and Game
330 Golden Shore, Suite 210
Long Beach, California 90802

Date

California-Nevada Office Manager
U.S. Fish and Wildlife Service
California-Nevada Office
Sacramento, California 95825

U.S. Fish and Wildlife Service has agreed to sign the INRMP after the Biological Opinion has been incorporated.

Date 9-19-02

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

Marine Air Ground Task Force Training Command Twentynine Palms, California

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MARINE AIR GROUND TASK FORCE TRAINING COMMAND REVIEW

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

MARINE AIR GROUND TASK FORCE TRAINING COMMAND TWENTYNINE PALMS, CALIFORNIA

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EXECUTIVE REPORT

Purpose and Need

The purpose of this Integrated Natural Resources Management Plan (INRMP) is to develop and follow a prescribed planning process in the management of natural resources at the Marine Air Ground Task Force Training Command at the Marine Corps Air Ground Combat Center, Twentynine Palms, California to support military mission readiness by ensuring lands are available for sustained use. This process meets statutory requirements under the Sikes Act Improvement Act, Public Law 105-85, Div. B Title XXIX, Nov. 18, 1997, 111 Stat 2017-2019, 2020-2033. This Act requires the Secretaries of the military departments to prepare and implement INRMPs for each military installation, unless exempted due to the absence of significant natural resources.

The Marine Air Ground Task Force Training Command, Twentynine Palms, California (hereinafter called MAGTFTC) has worked in cooperation with the U.S. Fish and Wildlife Service and the California Department of Fish and Game so that the INRMP will reflect the mutual agreement of these parties on all regulatory requirements concerning the conservation, protection, and management of fish and wildlife resources on the Marine Corps Air Ground Combat Center (MCAGCC or the Combat Center). Also, as required by the Sikes Act Improvement Act, this INRMP is provided herewith for public comment. Such comment will be taken into account in finalizing the plan.

This INRMP guides implementation of the natural resources program by the MAGTFTC from Fiscal Years 2002 through 2006. The program also conserves the MAGTFTC land and natural resources and helps ensure compliance with environmental laws and regulations. The INRMP also helps ensure the maintenance of quality training lands to accomplish MAGTFTC's critical military mission on a sustained basis and to ensure that natural resources conservation measures and Marine Corps activities on mission land are integrated and consistent with federal stewardship requirements.

This INRMP serves as the Interim Endangered Species Management Plan for the desert tortoise on the Combat Center. This INRMP will be modified to incorporate requirements of the U.S. Fish and Wildlife Service for the protection and management of the desert tortoise when the Service issues its Biological Opinion to MAGTFTC in response to the MAGTFTC Biological Assessment. Following these anticipated revisions, this INRMP will be the Endangered Species Management Plan for MAGTFTC.

Environmental Compliance

Preparation and implementation of this INRMP are required by the Sikes Act Improvement Act, Department of Defense Instruction 4715.3 (*Environmental Conservation Program*), and Marine Corps Order P5090.2A (*Environmental Compliance and Protection Manual*). The *Handbook for Preparing Integrated Natural Resources Management Plans for Marine Corps Installations* (November 1999) was used to guide the preparation of this INRMP. In addition this INRMP helps ensure that MAGTFTC complies with applicable federal and state laws, most notably laws associated with environmental documentation, endangered species, water quality, and management of wildlife in general.

This INRMP has been coordinated with the U.S. Fish and Wildlife Service for endorsement. When endorsed, it signifies agreement that the INRMP complies with the Endangered Species Act. Review of the INRMP constitutes informal consultation with regard to the Endangered Species Act as the installation has already submitted a biological assessment for formal consultation.

The Sikes Act, as amended in November 1997, requires that INRMPs include:

- fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration where necessary to support fish, wildlife, or plants;
- integration of, and consistency among, the various activities conducted under the INRMP;
- establishment of specific natural resource management goals and objectives and time frames for proposed actions;
- sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources;
- public access to the military installation that is necessary or appropriate for sustainable use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security;
- enforcement of applicable natural resource laws (including regulations);
- no net loss in the capability of military installation lands to support the military mission of the installation;
- such other activities as the Secretary of the military department determines appropriate;
- regular review of this INRMP and its effects, not less often than every five years;
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish and wildlife.

This INRMP includes these above items as applicable to natural resources management and land use at the Combat Center.

In effort to implement the spirit and intent of the Sikes Act Amendments of 1997, this INRMP serves to provide adequate management or protection, a term that originated from Section 3 of the Endangered Species Act. If adequate management or protection is already in place, then additional special management is not required when lands are found to contain physical and biological features essential to the conservation of the species. Adequate management or protection is provided by a legally operative plan that addresses the maintenance and improvement of primary constituent elements important to the species and manages for the long-term conservation of the species. This reasoning leads to the conclusion made by the U.S. Fish and Wildlife Service that, where applicable, federal critical habitat designation is not warranted if the INRMP includes the following three criteria:

1. The plan provides a conservation benefit to the species. Cumulative benefits of the management activities identified in a management plan, for the length of the plan, must maintain or provide for an increase in a species' population or the enhancement or restoration of its habitat within the area covered by the plan [*i.e.*, those areas deemed essential to the conservation of the species]. A conservation benefit

may result from reducing fragmentation of habitat, maintaining or increasing populations, ensuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, or testing and implementing new conservation strategies.

- The flora and fauna inventory and monitoring, habitat management, wildlife population management, desert tortoise protection, and numerous other projects discussed in this INRMP will provide a cumulative conservation benefit to the species.

2. **The plan provides certainty that the management plan will be implemented.** Persons charged with plan implementation are capable of accomplishing objectives of the management plan and have adequate funding for the management plan. They have the authority to implement the plan and have obtained all necessary authorizations or approvals. An implementation schedule (including completion dates) for the conservation effort is provided in the plan.

- The MAGTFTC Commanding General has the authority to implement the plan, which will be accomplished by the Natural Resources and Environmental Affairs Division staff, as scheduled (Appendix 7.4) and budgeted (Section 7.5).

3. **The plan provides certainty that the conservation effort will be effective.** The following criteria will be considered when determining the effectiveness of the conservation effort. The plan includes (1) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals); (2) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives and standards for these parameters by which progress will be measured are identified; (3) provisions for monitoring and, where appropriate, adaptive management; (4) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided; and (5) a duration sufficient to implement the plan and achieve benefits of its goals and objectives.

- Goals, objectives, and long-term ecosystem needs, based on land use sustainability for the Defense mission, have been analyzed and considered extensively in collaboration with persons contacted while preparing this plan. Goals and objectives are defined for the plan as a whole (Section 1.2.1) and each project within the plan (chapters 4, 5, and 7). Monitoring will occur within Natural Resources and Environmental Affairs on a regular basis and, more formally, through the Environmental Compliance Evaluation by Headquarters Marine Corps at least every three years. When the USFWS issues its Biological Opinion, this plan will be adjusted, as needed, to implement requirements of the Biological Opinion, which are anticipated to comply with above criteria.

Scope

The INRMP will provide the basis and criteria for protecting and enhancing natural resources using landscape and ecosystem perspectives, consistent with the military mission. The INRMP defines the level of management and provides the vehicle by which the Marine Corps participates in developing regional planning efforts under the BLM's West Mojave Coordinated Management Plan.

This plan applies to organizations internal and external to MAGTFTC that are involved with or interested in the management or use of MCAGCC natural resources and lands. This application includes active duty units, reserve components, directorates, private groups, and individuals. This INRMP is an integral part of the MAGTFTC Master Plan.

Relationship to the Military Mission

MCAGCC, the world's largest U.S. Marine Corps training site, conducts the Marine Corps Combined Arms Exercises program. The Combat Center's 935 square miles provide high quality, realistic training land for Marine Corps, Navy, Army, Air Force, and Reserve forces. The MAGTFTC training mission with regard to land use evolves with the development of new weapon systems and tactics. MAGTFTC annually provides training to one-third of the Fleet Marine Force and United States Marine Corps Reserves using 10 live-fire Combined Arms Exercises as well as numerous other training exercises.

The MCAGCC's natural resources program has been steadily building a tradition of quality natural resources management. This INRMP continues this tradition by ensuring stewardship of natural resources and compliance with laws and regulations. This INRMP supports the military mission by protecting and enhancing training lands upon which the mission is critically dependent.

Training areas, landing fields, targetry, main supply routes, fixed ranges, support areas, and safety buffer zones on the Combat Center comprise the Marine Corps largest facility where American armed forces can train troops and test equipment to practice and perfect the principles of engagement for tomorrow's armed conflicts. The area is habitat for nearly 400 species of Mojave Desert plants, and more than 250 species of vertebrate wildlife species have been documented. This document defines the constituents and establishes the methods by which natural resources management will be accomplished along with the military mission. The MAGTFTC military mission requires quality training lands and involves considerable interaction with the installation's natural resources.

The INRMP describes impacts of the military mission and training activities and discusses natural resources management plans to offset impacts and protect and preserve the Mojave Desert ecosystem. However, this INRMP does not evaluate the MAGTFTC military mission, nor does it replace any requirement for environmental documentation of the military mission at the MAGTFTC.

Partnerships

This INRMP was prepared and reviewed in cooperation with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG), representing the Sikes Act federal and state wildlife cooperating agencies, respectively. As MAGTFTC's largest neighbor and lead agency in the West Mojave Coordinated Management Plan, the Bureau of Land Management (BLM) is an important partner in land management. As detailed within this INRMP, MAGTFTC works closely with other federal, state, and local agencies in regional ecosystem management efforts. MAGTFTC is committed to a partnership role in the Mojave Desert Ecosystem Program. Many of these regional efforts include close working relationships with other Department of Defense installations (Edwards Air Force Base, the National Training Center and Fort Irwin, Marine Corps Logistics Base at Barstow, and Naval

Air Weapons Station at China Lake). Universities throughout the region have played important roles in the development of the natural resources program at the Combat Center.

Planned Major Initiatives

This INRMP includes a description of ongoing and planned natural resources programs and projects at the Combat Center. Most of these will either be continued or completed. The most significant projects within this INRMP include:

- protection of sensitive natural resources areas;
- managing the desert tortoise to ensure compliance with the Endangered Species Act;
- protecting cultural resources while conducting natural resources management;
- monitoring floral and faunal resources at the Combat Center;
- support Mojave Desert regional initiatives;
- informing Marines and other members of the MAGTFTC community of the value of the installation's natural resources and means to conserve those resources;
- using a remote sensing/geographic information system to allow better decisions regarding use and management of MAGTFTC natural resources;
- implementing an ecosystem management philosophy that provides biodiversity conservation;
- developing and implementing a wildfire management plan; and
- using the National Environmental Policy Act (NEPA) to conserve natural resources.

Monitoring INRMP Implementation

INRMP implementation will be evaluated primarily through the Environmental Compliance Evaluation (ECE), that involves a Headquarters Marine Corps onsite evaluation every three years with MAGTFTC self-evaluations during each of the two interim years. The list of INRMP goals and objectives in Appendix 7.4 can provide a basis for evaluating plan implementation.

The ECE accomplishes the following (MCO P5090.2A):

- assesses installation compliance status and recommends corrective actions;
- provides a forum for the exchange of ideas and successes;
- provides Headquarters Marine Corps with a broad evaluation of compliance across the Corps; and
- provides an interface on environmental issues between installations, Fleet Marine Force commanders, and Headquarters Marine Corps.

Costs and Benefits

- **Costs:** This INRMP will cost about $4,092,500 for Fiscal Years (FY) 2002-2006 to implement. Funding will be primarily from Operations and Maintenance Marine Corps Funds.
- **Military Mission Benefits:** Implementation of this INRMP will maintain the overall quality of training land. It will enhance mission realism through the perpetuation of realistic training lands. It will reduce maintenance costs and improve the capability for long range planning at the MAGTFTC.

- **Environmental Benefits:** The INRMP provides the basis for the conservation of natural resources. It will help reduce vegetation loss and soil erosion due to military activities. It will reduce the potential for environmental pollution. It will provide biodiversity conservation. Plan implementation will increase overall knowledge of the operation of the MCAGCC and regional ecosystem through surveys and research.
- **Other Benefits:** Individual Marine's environmental awareness will be enhanced while training at the Combat Center. Both community relations and the MAGTFTC's environmental image, internal and external to Defense, will be enhanced. INRMP implementation will decrease long term environmental costs and reduce personal and installation liabilities from environmental noncompliance.

INRMP Organization

This INRMP is organized as follows:

- Chapter 1 describes general relationships between natural resources management and the overall MAGTFTC mission. It lists compliance requirements, describes the natural resources management philosophy as a whole, describes regional programs, and provides a summary of the National Environmental Policy Act (NEPA) process and alternatives used to develop the environmental assessment portion of this INRMP.
- Chapter 2 identifies responsible parties and their roles implementing this INRMP.
- Chapter 3 describes the affected environment at the Combat Center, including a description of the military mission and land management units.
- Chapters 4-5 describe natural resources programs, using specific project descriptions.
- Chapter 6 identifies unresolved issues.
- Chapter 7 describes means used to implement this INRMP, including organization, personnel, external assistance, data collection and analysis, a project summary, project funding, and command support.
- Chapter 8 describes the overall environmental consequences of implementing this INRMP.

Natural resources projects planned for FY 2002-2006 are fully described in chapters 4, 5 and 7, summarized for budget purposes in Section 7.5, and summarized in tabular form with abbreviated goals and objectives in Appendix 7.4.

Summary

The INRMP outlines steps required to meet Department of Defense, U.S. Marine Corps, and MAGTFTC legal obligations to provide for the stewardship of the natural resources at the Combat Center while enabling the accomplishment of the military mission. The INRMP has been generated through cooperation with appropriate regulatory agencies. As a public document, it will support and perpetuate the military mission while fostering stewardship and goodwill for MAGTFTC, the U.S. Marine Corps, and the Department of Defense throughout the Mojave Desert ecosystem.

1.0 GENERAL POLICIES AND NEPA INTEGRATION

The Marine Corps commitment to natural resources management was recently reaffirmed in the Marine Corps Installations Campaign Plan (U.S. Marine Corps, 2000), that states, "*We will enhance our environmental and encroachment prevention programs because these programs serve as tools for installation and operating force commanders to meet federal, state and local laws and preclude downgrading or loss of training or operational opportunities. We will enhance our "good neighbor" policy with surrounding communities to ensure mutual support of both our needs and concerns.*"

This chapter discusses MAGTFTC overall strategies for managing natural resources as part of the Command's mission. These are discussed in local, regional, and national contexts. Additionally, the chapter discusses the overall integration of necessary environmental documentation within this INRMP.

The Command and staff of MAGTFTC are committed to environmental stewardship as an integral part of the mission at the Combat Center. This commitment is evidenced by support of past environmental programs and their full support of this Integrated Natural Resource Management Plan.

It is important to understand the relationship between the natural resources program and MAGTFTC as a whole. A comparison of MAGTFTC mission with the mission, goals, and objectives of the natural resources program helps identify this relationship.

1.1 The MAGTFTC Mission

Develop and conduct the Marine Corps' Combined Arms Training Program.
Provide support to the Marine Corps Communications Electronic School.

1.2 MAGTFTC Natural Resources Mission, General Goals and Objectives, and Drivers

Mission

To ensure that MAGTFTC's mission and support activities are compliant with environmental regulatory requirements and that all training lands are effectively managed to meet existing and future training demands.

1.2.1 General Goals and Objectives

Below are the MAGTFTC general natural resources goals and objectives. These objectives and those more specific in chapters 4, 5, and 7 serve as a checklist to monitor the success of the INRMP. Some objectives fit more than one category. When this occurs, the most-fitting category was chosen.

Goal 1. Provide quality natural resources as a critical training asset upon which to accomplish the military mission at MAGTFTC.

Objective 1. Ensure no-net-loss in the capability of installation lands to support existing and projected military training and operations at MAGTFTC.

Objective 2. Maintain quality training lands through range monitoring and disturbance minimization and mitigation.

Objective 3. Identify key encroachment issues and work to resolve them to maintain land and air resources and maximize training opportunities.

Goal 2. Comply with laws and regulations that pertain to management of MAGTFTC natural resources.

Objective 1. Manage natural resources in accordance with all applicable environmental laws, particularly the Sikes Act upon which this INRMP is predicated.

Objective 2. Manage sensitive species consistent with the training mission.

Objective 3. Use procedures within the National Environmental Policy Act (NEPA) to make informed decisions that include natural resources considerations and mitigation.

Objective 4. Ensure the MAGTFTC natural resources program is consistent with the protection of significant cultural and historic resources.

Objective 5. Implement this INRMP within the framework of all applicable Marine Corps policies and regulations.

Objective 6. Protect and manage threatened and endangered species and their habitats in accordance with the Endangered Species Act, Marine Corps Order P5090.2A, DoD Directive 4715.3, USFWS regulations and agreements, and other applicable laws or guidance from higher headquarters. Consider raptors and species listed by the State of California during project planning.

Goal 3. Manage natural resources at MAGTFTC to ensure good stewardship of public lands entrusted to the care of the Marine Corps.

Objective 1. Use adaptive ecosystem management strategies to conserve native fauna and flora.

Objective 2. Monitor and manage soils, water, vegetation, and wildlife at MAGTFTC with a consideration for all biological communities and human values associated with these resources.

Objective 3. Participate in regional ecosystem initiatives and planning efforts.

Objective 4. Ensure the MAGTFTC natural resources program is coordinated with installation organizations and other agencies.

Objective 5. Provide conservation education opportunities.

1.2.2 Natural Resources Drivers

A "driver" identifies a need to be satisfied in order for the mission to continue without disruption. Drivers are defined by the mission, land uses, and natural resources affected by the mission (U.S. Marine Corps, 1999).

The following general drivers have been identified at MAGTFTC:

- compliance with federal laws, such as the Sikes Act, Endangered Species Act, Clean Water Act, and Clean Air Act, in such a fashion as to not impede mission activities;
- maintain the capability of MAGTFTC to support its military mission (Sikes Act) and ensure that land areas are continuously available for military use;
- participation in regional ecosystem initiatives to manage MAGTFTC natural resources consistent with Department of Defense and MAGTFTC policies; and
- provide stewardship for public lands.

These drivers were used to develop goals and their supporting objectives in chapters 4, 5, and 7.

1.3 Support of Installation Mission

Implementation of this INRMP will support the MAGTFTC mission. The natural resources team at the MAGTFTC is committed to supporting the military mission, providing stewardship of resources entrusted to the Marine Corps, ensuring environmental compliance, ensuring no-net-loss in the capability of MCAGCC lands to support the training mission, and being a requisite member of the MAGTFTC team. Implementation of this INRMP will demonstrate those qualities.

A legally-mandated objective of the Natural Resources Branch, Natural Resources and Environmental Affairs Division (NREA) is ***to ensure no-net-loss in the capability of MAGTFTC lands to support the military mission.*** The accomplishment of this objective is via three projects that are discussed in their respective sections of this INRMP:

- Training Land Monitoring (Section 4.9.1) will monitor those aspects of the land and its natural resources that directly are related to military training (*e.g.*, disturbance, concealment, soil capability to support maneuver, dust potential, safety hazards, fuel loads), emphasizing parameters that can be used for management purposes.
- Training Land Management (Section 4.9.2) will coordinate with military training organizations to minimize disturbance to training lands and natural and cultural resources (*e.g.*, road proliferation prevention, protection of resources, dust control) and when justified and cost effective, restore training lands.
- The NREA Mission Awareness project (Section 5.2.1) will develop an awareness of values and requirements of natural and cultural resources protection on the Combat Center to support sustained military training. The primary target audience for the Mission Awareness project will be those who train or affect training at the Combat Center. A secondary audience will be those who are interested in training on the Combat Center (generally external).

1.4 Compliance Requirements

DoD Instruction 4715.3 and Marine Corps Order P5090.2A require that integrated natural resource management plans be developed and maintained for DoD and Marine Corps lands. Other pertinent regulations and legislation relevant to natural resources management are listed below.

Public Law 85-624	Fish and Wildlife Coordination Act
Public Law 96-561	Fish and Wildlife Conservation and Natural Resource Management Programs on Military Reservation: Amends Public Law 86-797 (Sikes Act)
Public Law 94-579	Federal Land Policy and Management Act of 1976
Public Law 89-669	Fish and Wildlife Conservation Act
Public Law 90-465	Conservation Programs on Military Reservations
Public Law 93-205	Endangered Species Act of 1973, as amended
Public Law 95-632	Endangered Species Act of 1973 (1978 amendments)
Public Law 86-70	Bald and Golden Eagle Protection Act, as amended
Public Law 91-190	National Environmental Policy Act
Public Law 92-522	Federal Water Pollution Control Act Amendments of 1972
Public Law 90-583	Noxious Plant Control Act
Public Law 93-629	Federal Noxious Weed Act of 1973
Public Law 93-452	Conservation and Rehabilitation Program on Military and Public Lands
Title 16 U.S. Code 703-711	Migratory Bird Treaty Act
Title 10 U.S. Code 2667	Leased, Non-excess Property
Title 10 U.S. Code 2671	Military Reservations and Facilities
Title 16 U.S. Code 590	Soil Conservation
Executive Order 11991	Protection and Enhancement of Environmental Quality: Amends Executive Order 11514
Executive Order 11989	Off-Road Vehicles on Public Lands
Executive Order 12608	Protection of Wetlands: Amends Executive Order 11990
Executive Order 13045	Protection of Children from Environmental Health Risks and Safety Risks
Executive Order 13112	Invasive Species
Executive Order 13186	Responsibilities of Federal Agencies to Protect Migratory Birds
DoD Instruction 4715.3	Environmental Conservation Program
DoD Directive 6050.2	Use of Off-Road Vehicles on DoD Lands
DoD Instruction 5000.13	Natural Resources
Marine Corps Order P5090.2A	Environmental Compliance and Protection Manual
Combat Center Order 5090.1B	Environmental Protection
Combat Center Order 5090.4	Environmental Impact Review Procedures

1.5 Biodiversity Conservation and Ecosystem Management

Biological diversity (biodiversity) refers to the variety and variability among living organisms and the environment in which they occur. Biodiversity has meaning at various levels, including ecosystem diversity, species diversity, and genetic diversity. The Department of Defense has developed *A Department of Defense (DoD) Biodiversity Management Strategy* (The Keystone Center, 1996). This Strategy identifies five reasons to conserve biodiversity on military lands:

(1) ***sustain natural landscapes*** required for the training and testing necessary to maintain military readiness;
(2) ***provide the greatest return on the Defense investment*** to preserve and protect the environment;
(3) ***expedite the compliance process*** and help avoid conflicts;
(4) ***engender public support*** for the military mission; and
(5) ***improve the quality of life*** for military personnel.

The Keystone Center report (1996) notes that the challenge is "*to manage for biodiversity in a way that supports the military mission.*" This strategy identifies the INRMP as the primary vehicle to implement biodiversity protection on military installations. The model process developed within the strategy includes the following principles:

- support the military mission;
- use joint planning between natural resources managers and military personnel;
- integrate biodiversity conservation into INRMP and other planning protocols;
- involve internal and external stakeholders up front;
- emphasize the regional (ecosystem) context;
- use adaptive management;
- involve scientists and use the best science available; and
- concentrate on results.

The Department of Defense (DoD Instruction 4715.3, *Environmental Conservation Program*) describes ecosystem management as, "*a process that considers the environment as a complex system functioning as a whole, not a collection of parts, and recognizes that people and their social and economic needs are a part of the whole.*" The Department of Defense goal with regard to ecosystem management is, "*To ensure that military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, that approach shall maintain and improve the sustainability and biological diversity of terrestrial and aquatic (including marine) ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations.*"

MAGTFTC will use ecosystem management to guide its program in the next five years and beyond. This management strategy enables the installation to conduct military training while conserving natural resources upon which the quality of training ultimately depends. Adaptive integrated management is an important component of ecosystem management process. The management process involves implementing the best option, evaluating that option's results, and modifying implementation accordingly.

1.6 Regional Cooperative Programs

The following regional land use or planning initiatives potentially influence natural resources management at MAGTFTC:

Desert Tortoise Recovery Plan. The desert tortoise *(Gopherus agassizii)* was listed as a threatened species in April 1990. The recovery plan outlining actions needed to recover and protect the species was finalized in 1994. The **Desert Tortoise Management Oversight Group** is comprised of Department of Interior and Department of Defense, including MAGTFTC, representatives. Additionally, other federal and state agency representatives as well as interested parties participate in this plan.

California Desert Conservation Area Plan. Section 601 of the Federal Land Policy and Management Act of 1976 requires the BLM to develop a plan (the California Desert Conservation Area Plan) for long-term protection and administration of public lands in the California desert. The California Desert Conservation Plan was finalized in 1980 and establishes general guidance for management of all BLM-administered lands in the California desert (Bureau of Land Management, 1997). Even though the Combat Center is not BLM-administered, the California Desert Conservation Area Plan is important since BLM lands border much of the Combat Center.

West Mojave Coordinated Management Plan

The West Mojave Coordinated Management Plan is a comprehensive, interagency planning effort for the conservation of biological resources in the West Mojave region. The West Mojave Coordinated Management Plan is a cooperative effort involving many different agencies including:

- five military installations (MAGTFTC, National Training Center and Fort Irwin, Naval Air Weapons Station China Lake, Edwards Air Force Base, and Marine Corps Logistics Base Barstow/Yermo);
- five federal managers, including BLM, National Park Service, and the U.S. Geological Survey Biological Resources Division;
- six State of California agencies, including CDFG;
- Indian Wells Valley Water District;
- five counties, including San Bernardino; and
- 11 incorporated towns and cities, including Twentynine Palms.

DoD installations in the West Mojave Desert will support the West Mojave Coordinated Management Plan to the extent that it does not conflict with the military mission. Natural resources management decisions made by MAGTFTC will be influenced by opinions of regional agencies, but implementation of the INRMP is the compliance requirement for Defense installations with regard to natural resources planning and implementation. This INRMP is the MAGTFTC contribution to the West Mojave Coordinated Management Plan.

Northern and Eastern Mojave Planning Effort. The Northern and Eastern Mojave Planning Effort will provide a regional perspective for the management of federal lands and will update agency-specific management plans to reflect changes made by the California Desert Protection Act of 1994. Since this planning area's southwestern boundary follows old Route 66, it has interest to MAGTFTC. The Northern

and Eastern Mojave interagency planning team consists of representatives from the National Park Service, BLM, and USFWS. Cooperating agencies include the Bureau of Indian Affairs; two military installations (not including MAGTFTC); U.S. Army Corps of Engineers; U.S. Environmental Protection Agency; five California and one Nevada agencies; three California and three Nevada counties; and three Native American Tribal Councils. Management plan alternatives and an EIS analyzing these alternatives will be prepared concurrently.

Mojave Desert Ecosystem Program

The Mojave Desert Ecosystem Program (MDEP) is a regional planning program in the Mojave Desert. Objectives of the program are to connect select environmental databases at the five military installations in the Mojave Desert with those residing at various Department of the Interior, other federal land agencies, and regionally associated state, county, and local government agencies, academic institutions, and private organizations. The ecosystem database will be maintained in Geographic Information System format. Participants in the MDEP are:

- Department of Defense: MAGTFTC, National Training Center and Fort Irwin, Naval Air Weapons Station China Lake, Edwards AFB, Nellis AFB, and Marine Corps Logistics Base at Barstow; and
- Department of Interior: BLM, National Park Service, USFWS, U.S. Geological Survey Biological Resources Division, and the U.S. Bureau of Mines.

Desert Manager's Group. The Desert Managers Group (DMG) was established to provide a forum for government agencies to work together to conserve and enhance the California Desert for current and future generations. The DMG meets quarterly. The MDEP DoD Coordinator is the co-chair and a voting member of this Group. This Group originated as a Department of Interior initiative to implement the 1994 Desert Protection Act. Military participation was invited when the MDEP (then an Initiative) was formed under the DoD. NREA Division represents MAGTFTC at the DMG meetings and participates in the Science/Data Management, Paleontological and Cultural Resources Action Team, and Desert Land Restoration interagency working groups. The MAGTFTC's Operations and Training Directorate participates in the Noise and Overflight working group[1].

1.7 INRMP and NEPA Integration

Environmental Quality Implementing Guidelines for NEPA (40 CFR Parts 1500-1508) require environmental analyses and documentation be integrated as much as practicable with other environmental reviews, laws, and executive orders. Recognizing efficiencies and benefits associated by combining the INRMP and its associated Environmental Assessment into one document, this plan has been developed to satisfy both requirements.

To assist in identifying elements of the NEPA analysis, the following are specific locations within this INRMP where required EA sections (40 CFR Part 1508.9(b)) are embedded.

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[1] Summarized from memorandum, *FW: Desert Manager's Draft Charter*, Roy. E. Madden, August 24, 1999.

- Purpose of and Need for Action - Section 1.7.1
- Description of Alternatives including the Proposed Action - Section 1.7.4; chapters 4, 5, and 7
- Description of Affected Environment - Chapter 3
- Analysis of Environmental Consequences - Chapter 8
- Analysis of Cumulative Impacts - Section 8.8
- Persons Consulted
- Distribution List
- Appendices

1.7.1 Purpose, Need, and Rationale

The MAGTFTC proposes to implement its Integrated Natural Resources Management Plan FY 2002-2006 at Twentynine Palms, California. The purpose of the Environmental Assessment is to identify and evaluate environmental consequences of implementing the proposed plan, in accordance with NEPA, the Council on Environmental Quality regulations, Marine Corps Order P5090.2A, and MAGTFTC Order 5090.4, *Environmental Impact Review Procedures*.

This INRMP is an "action-forcing" document that triggers NEPA compliance requirements. Marine Corps guidance recommends that the INRMP and NEPA document be the same document and states that the INRMP will normally use environmental assessment procedures (U.S. Marine Corps, 1999). Council on Environmental Quality regulations allow NEPA documents to be combined with other agency documents to reduce paperwork and duplication (40 CFR 1506.4). This combined INRMP/environmental assessment documents existing natural resources practices and can be used as an effective tool for future planning and decision making purposes.

A description of viable alternatives is within each section in Chapters 4, 5, and 7. Environmental consequences of implementing this plan are in Chapter 8.

1.7.2 Scope

The preferred alternative (Alternative 1) is restricted to implementation of the INRMP. Environmental effects of implementing this plan at MAGTFTC are the focus of environmental assessment aspects integrated into this plan.

1.7.3 Impact Analysis

The analysis process involved the review of installation natural resources-related data collected by MAGTFTC, other governmental agencies, universities, and contractors. The process involved interviews with MAGTFTC personnel involved with natural resources management, military mission planning, and installation maintenance.

1.7.4 Alternatives

There are issues that will not be considered in alternative analyses sections as they take precedence over almost all management options. First and foremost, the MAGTFTC military mission must not be compromised. The exception would be the adoption of restrictions or alterations to standard operating procedures to comply with laws, such as the Endangered Species Act.

Second, the issues of safety and security must not be compromised. Safety and security are high priorities to MAGTFTC and are directly related to maintaining the military mission. Therefore, management options that create significant safety and/or security risks (*e.g.*, opening MCAGCC training areas to access for outdoor recreation) will not be considered.

Alternative 1: Proactive Management

Alternative 1 would be to continue to implement those portions of the Multiple Land Use Management Plan, 1996-2000 that are pertinent to an evolving natural resources program with some changes in programs that will enable the MAGTFTC to more effectively and efficiently support the military mission. Alternative 1 is fully described in this Integrated Natural Resources Management Plan, FY 2002-2006. Alternative 1 is the MAGTFTC preferred alternative.

This INRMP presents information on the management of natural resources on the Combat Center. It also describes the setting, defines land management units, and describes how these units will be managed to sustain ecological functions, protect federally-listed and other wildlife species, provide sustained military use, and support outdoor recreational uses. Major emphasis will be placed on proactive management to reduce the potential for negative environmental impacts due to the installation military mission. Alternative 1, as described in Section 7.5.2, has three classes of projects. Class 1 - projects that need to be implemented in current year to be in compliance (limited implementation flexibility). Class 2 - projects needed to prevent future noncompliance (some implementation flexibility), and Class 3 - projects with no compliance requirements.

Alternative 1 is viable. This alternative ***will*** be described following each management section.

Alternative 2: Continue Existing Management (No Action)

Alternative 2 would be to continue management to support the military mission, as outlined in the Multiple Land Use Management Plan, 1996-2000. Alternative 2 is similar to the No Action Alternative described in the *Handbook for Preparing Integrated Natural Resources Management Plans for Marine Corps Installations* (U.S. Marine Corps, 1999).

Alternative 2 is viable. This alternative ***will*** be described following each management section.

Alternative 3: Enhanced Stewardship

Alternative 3 would be to implement projects that would enhance the stewardship of public lands, in addition to those proposed in Alternative 1 (this INRMP). In general, these projects are not within the

Preferred Alternative due to anticipated limited funding and a lack of compliance requirements for higher implementation priorities.

Alternative 3 is technically viable even if funding is highly unlikely. This alternative ***will*** be described following each management section.

Alternatives Considered but Eliminated

No Management. The No Management Alternative would be to not manage natural resources at the Combat Center to support the military mission. This alternative is similar to the manner in which the installation was managed prior to the passage of many environmental laws in the late 1960s through early 1970s and before the creation of professional natural resources management in the early 1980s. This is not a viable alternative. Laws and executive orders on endangered species, water quality, federal land management, outdoor recreation, etc., as well as Department of Defense and Marine Corps policies, preclude the implementation of the No Management Alternative. This alternative ***will not*** be further discussed.

Compliance Management. The Compliance Alternative would be to implement only those portions of the INRMP required to maintain compliance with laws. Compliance with laws, such as the Endangered Species Act and National Environmental Policy Act, will ensure implementation of some programs but will ignore other programs within the INRMP. It is a lower intensity natural resources program that is reactive to violations of laws or threats of lawsuits.

Passage of the Sikes Act in 1997 requires INRMPs to include programs such as wildlife management, land management, fish and wildlife habitat management, etc. (see Executive Report). The Sikes Act further requires implementation of programs identified within the INRMP. Therefore, each program within the INRMP is compliance driven unless it is specifically identified as optional (dependent upon additional funding, dependent upon future conditions, etc.). Thus, the Compliance Management Alternative is virtually identical to Alternative 1, Proactive Management, that is full implementation of the INRMP. The Compliance Management Alternative ***will not*** be further discussed in analysis sections.

Other Management Options Eliminated

Virtually every major natural resources program at the Combat Center (wildlife management, training support monitoring, pest management, etc.) has options other than ones selected for the INRMP. For example, there are many different strategies with regard to desert ecosystem disturbance minimization, just as there are numerous options for monitoring training lands and dealing with encroachment issues. As inherent with integrated programs, many of these interact with each other. For example, reducing or increasing levels of exotic species control can significantly affect ecosystem functionality (through such mechanisms as increased or decreased wildfire disturbance, changes in competition levels with native species, etc.).

Possible options create almost countless potential combinations, each of which could be an alternative to the proposed action. Various laws, compliance documents, Marine Corps' regulations, etc. prohibit the implementation of many of these possibilities. For example, training that creates desert tortoise mortality

beyond defined limits is not a viable option due to public law and Department of Defense policy. On the other hand, selecting management techniques for rehabilitating disturbed land is an option, and there are many choices. The same would be true of changing the monitoring program for vegetation condition trends or changing the bighorn sheep and other wildlife watering device program.

Other management options that have been considered but eliminated for various reasons (*e.g.*, ecological value, cost/benefit analyses, military mission compatibility) ***will*** be identified following each management section in chapters 4, 5, and 7. However, consequences of these ***will not*** be discussed in Chapter 8.

1.7.5 Alternatives Summary

Each management section in chapters 4, 5, and 7 has five major subsections:

- Project description in a standard format: Title, Drivers, Funding Priority, Project Timing, Regulatory Approvals, Vehicle for Project Implementation, and Success Monitoring;
- Alternative 1 (Preferred), which includes a list of objectives to be accomplished if this INRMP is implemented;
- Alternative 2 (No Action), which describes ongoing activities or activities planned in the previous Multiple Land Use Management Plan;
- Alternative 3 (Enhanced Stewardship), which describes activities that could be accomplished but are not currently viable for funding; and
- Management Options Eliminated, which identifies options that were not chosen with brief rationale for their elimination.

Chapter 8, Environmental Consequences, analyzes environmental consequences of implementation of this INRMP (Preferred Alternative 1), continuation of current management (No Action Alternative 2), and implementation of projects for enhanced stewardship (Alternative 3).

1.7.6 Interagency Coordination and Public Review

Interagency coordination was invited through the INRMP/EA development process using personal communications and reviews of drafts. Drafts of this INRMP/EA were used to inform decision makers and the public of likely environmental and socioeconomic consequences of implementing the Preferred Alternative and its alternatives.

Public review opportunity included notification of the availability of the Draft INRMP/EA in public libraries at Twentynine Palms and Yucca Valley as well as the NREA Office. This notification, with a 60-day review period, was published in very visible ads in the *Desert Trail*, *Hi-Desert Star*, and MAGTFTC *Observation Post*. No comments were received.

The public was notified of findings and conclusions of the EA by announcement of the Finding of No Significant Impact in the *Desert Trail*, *Hi-Desert Star*, and MAGTFTC *Observation Post* and the availability of the INRMP/EA for public review for 30 days prior to implementation of the Preferred

Action, this INRMP, by MAGTFTC. The final INRMP was available in public libraries at Twentynine Palms and Yucca Valley as well as the NREA Office.

2.0 RESPONSIBLE AND INTERESTED PARTIES

2.1 MAGTFTC, Twentynine Palms

2.1.1 Commanding General

The MAGTFTC ***Commanding General*** (CG) is directly responsible for accomplishing the MAGTFTC mission, including the administration, conduct and support of the CAX training program. In addition, he is responsible for MCAGCC property, facilities, and assigned personnel. The CG exercises control over all participating (active and reserve) units and maintains liaison with the Fleet Marine Force, other military commands, and federal, state, county, and local agencies. The CG is personally responsible for complying with environmental laws and regulations. The CG executes his responsibilities through MAGTFTC directorates.

2.1.2 Installations and Logistics Directorate

The ***Installation and Logistics Directorate*** plans, initiates, controls, and coordinates maintenance, supply, motor transport, food service, purchasing and contracting, construction of new facilities, and major repairs to facilities. The Installations and Logistics Directorate is also responsible for the management of land and facilities on MAGTFTC in support of the military mission. As such, this includes the development and implementation of this INRMP.

2.1.2.1 Natural Resources and Environmental Affairs Division

The ***Natural Resources and Environmental Affairs Division*** (NREA) is responsible for natural and cultural resources management, pollution prevention, installation and environmental restoration, compliance, natural resources damage assessment, and encroachment source monitoring. NREA is the liaison for MAGTFTC for these matters with Headquarters Marine Corps; Naval Facilities Engineering Services Command; Engineering Field Division; federal, state and local agencies; regulatory authorities; and science and academic communities. NREA is also responsible for environmental affairs, that include but are not limited to the management of hazardous wastes, monitoring ground water, and air quality.

The ***Natural Resources Branch***, under the ***Natural Resources Officer***, is responsible for the day-to-day and long-term management of natural and cultural resources within MCAGCC boundaries. Branch responsibilities include but are not limited to the management of soil, air, water, vegetation, wildlife, and archaeological and historic resources. The Natural Resources Branch provides liaison between MAGTFTC and other federal land owners and consults with state and federal regulatory agencies, particularly regarding regional initiatives, threatened and endangered species, and cultural resources. The branch ensures that MCAGCC land use is monitored and that the best scientific practices for land management are implemented to sustain the Marine Corps training mission.

The ***Ecological Support Section*** within the Conservation Branch, under the direction of the ***Natural Resources Manager***, is directly responsible for the development and implementation of this INRMP. The ***Cultural Resources Section***, under the direction of the ***Cultural Resources Manager***, is directly

responsible for the development and implementation of the Integrated Cultural Resources Management Plan.

The ***Compliance Enforcement Branch*** is responsible for conducting quarterly inspections of hazardous material/hazardous waste operations at a number of Satellite Accumulation Areas and the Hazardous Waste Accumulation Area. Local, state, and federal regulations are followed to ensure compliance.

In executing its responsibility for monitoring and minimizing pollution in air, water, and soil, the ***Environmental Affairs Branch*** ensures all activities taken to investigate, characterize, evaluate, and correct MCAGCC releases of a hazardous waste, hazardous constituent, or hazardous substance comply with all applicable federal, state, interstate, and local requirements. These requirements may include the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 USC §§ 9601-9675, the National Oil and Hazardous Substances Contingency Plan, 40 CFR Part 300, and the Department of Defense Environmental Restoration Program, 10 USC §§ 2701-2709. On July 13, 2001 MAGTFTC completed a Site Management Plan (Battelle, 2001) to identify the processes and procedures to properly manage its 63 environmental restoration sites. The Site Management Plan contains voluminous background information (including site data and history, work plans, and summary reports), regulatory status, proposed action, and actions required for site closure.

The ***Technical Support Branch***, includes the Geospatial Information and Services Office that is responsible for providing services needed to implement this INRMP. The Technical Support Branch also provides NEPA services to support natural resources protection and management.

2.1.2.2 Other Installations and Logistics Divisions

NREA must work closely with other divisions within the Installations and Logistics Directorate to achieve its responsibilities. These particularly include the Facilities Management Division (*e.g.*, NEPA documentation of proposed projects, hazardous material management, integration of environmental requirements during facility development/maintenance) and the Supply Division (*e.g.*, recycling, hazardous waste management, procurement of supplies and equipment).

2.1.3 Operations and Training Directorate

The ***Operations and Training Directorate*** (O&T) maintains administrative and operational control of the training ranges. O&T manages and/or coordinates all operational functions, training, training support, and range management functions. Below are organizations within O&T that are particularly important to implementation of this INRMP.

The ***Range Operations Section/Range Control*** (often called ***BEARMAT*** after its radio call sign) is directly responsible for day-to-day operations of the Range Training Area and Airspace (RTAA), including responsibility for all range operations (excluding rifle and pistol ranges). The Operations Officer is directly responsible to the Director of O&T for day-to-day operations, the development of new ranges, and the preparation, administration, and coordination of the MAGTFTC Five-Year Range Management Plan. Range Operations provides a single scheduling authority for all training conducted in the RTAA, coordinates airspace usage with the Federal Aviation Administration, maintains data on range

usage of the RTAA, controls medical evacuations, and provides a means of passing and receiving essential information to all commands engaged in training aboard the Combat Center.

The ***Range/Laser Safety Section*** is responsible for the enforcement of safety and inspection standards/ regulations throughout the RTAA. Range Safety Inspectors consult with the NREA Division regarding potential/inactive environmental violations. They may impose an immediate cease fire and, if necessary, direct required corrective action before the resumption of live fire. Each inspector serves as a direct representative of the Director of O&T for control of the entire RTAA, to include laser certification and range safety briefs.

The ***Range/Training Area Maintenance Section*** maintains all Main Supply Routes, facilities, and signage; supervises and exercise police of the training areas; and provides target construction and emplacement in support of the CAX.

The ***Explosive Ordnance Disposal Section*** provides trained personnel and special equipment to render safe and/or destroy by detonation unexploded and dud ordnance and other explosive devices found aboard the Combat Center. When requested, and as approved by the CG and Director of O&T, the Explosive Ordnance Disposal Section supports local, state, and federal law enforcement agencies.

2.1.4 Tactical Training Exercise Control Group

The ***Tactical Training Exercise Control Group*** is responsible for the development and conduct of the CAX program to train units in the control and coordination of supporting arms. In addition, the Tactical Training Exercise Control Group explores more innovative means for the Fleet Marine Force to accomplish its mission.

2.1.5 Public Affairs Office

The ***Public Affairs Office*** is available to assist NREA with those aspects of implementation of this INRMP that involve the collection or dissemination of information from/to the general public. This office also becomes involved in the resolution of natural resources issues that affect the off-base community.

2.1.6 Comptroller

The ***Comptroller*** is responsible for applying for environmental funding needed to implement this INRMP.

2.2 Other Defense Organizations

2.2.1 Headquarters Marine Corps

Headquarters Marine Corps, located in Washington D.C., is responsible for providing general policy, Marine Corps Orders implementing such policy, and funding to implement natural resources programs at MCAGCC. Headquarters Marine Corps conducts an onsite Environmental Compliance Evaluation of the

MAGTFTC natural resources program at least once every three years.

2.2.2 U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers is available to assist MAGTFTC with contracting activities. This INRMP was prepared under a contract administered by the Sacramento Office of the Corps of Engineers.

The Corps of Engineers, Engineering Research and Development Center at WES (Waterways Experiment Station) assisted MAGTFTC by preparing natural resources studies, including *Identification and Characterization of "Waters of the United States," Delineation of Deadman Dry Lake*, and *Delineation of Mesquite Dry Lake at the Marine Corps Air Ground Combat Center, Twentynine Palms, California*.

The Corps of Engineers, Engineering Research and Development Center at CERL (Construction Engineering Research Laboratory) assisted MAGTFTC by preparing the Wildlife and Biodiversity Management Plan (Krzysik and Trumbull, 1996). The Engineering Research and Development Center is collaborating with the University of Nevada, Reno; Utah State University; University of Illinois, Urbana; and Oak Ridge National Laboratory to develop landscape-level change detection methods using remote sensing and traditional field measurements. MCAGCC is one of the study sites being used for this effort. The Combat Center is also a test site for the development of a model for wind erosion by the Engineering Research and Development Center.

2.2.3 Naval Facilities Engineering Command, Southwest Division

Southwest Division, Naval Facilities Engineering Command (NAVFACENGCOM) provides engineering support and services to activities of the naval shore establishment, including MAGTFTC.

2.2.4 Other Military Installations

MAGTFTC coordinates and cooperates with other military installations within the Mojave Desert on numerous programs, including the Mojave Desert Ecosystem Program (MDEP). Installations often involved with MAGTFTC in these efforts include Edwards Air Force Base, National Training Center and Fort Irwin, Marine Corps Logistics Base at Barstow, and Naval Air Weapons Station at China Lake. Representatives of these installations and Department of Interior agencies are represented on the ***California Desert Managers Group*** (Section 1.6).

These five Department of Defense installations have formed a team (***Planning and Coordination of Interagency Desert Environmental Resource Managers*** [PACIDERM]), that meets quarterly to coordinate and discuss land use issues of mutual interest. The MDEP DoD Coordinator is the Executive Secretary of PACIDERM, and NREA is the MAGTFTC representative. These installations have many mutual interests, particularly involving ecosystem management of the Mojave Desert, as evidenced by regional initiatives identified in Section 1.6.

The ***Mojave Desert Environmental Policy and Planning Board*** was founded under direction of the Deputy Under Secretary of Defense, Environmental Security to "preserve and enhance the efficiency,

effectiveness, and economical operation of Mojave Desert Department of Defense installations, ranges, and training centers in dealing with environmental compliance and encroachment issues."[2] The Board is composed of the commanders of MAGTFTC, National Training Center and Fort Irwin, Naval Air Warfare Center at China Lake, Edwards Air Force Base, and Marine Corps Logistics Base, Barstow. Most activities of the Board are conducted through its ***Environmental Executive Board***, that is composed on one representative of each installation. The MAGTFTC representative is the NREA Division Head.

The Department of Defense has created a ***Regional Environmental Coordination*** program, operated by ***Joint Western Regional Environmental Coordinators***. The program has three charges:

- coordinate consistent interpretation of Department of Defense policies;
- consult with combat commanders on issues affecting training, operations, and warfighting; and
- articulate Department of Defense positions with regard to regional, state, and local authorities.

The Marine Corps created a ***West Coast Regional Review Board*** to implement the ***Marine Corps Regional Environmental Coordination*** program. This program has three charges:

- focus on those environmental requirements that may impede U.S. Marine Corps mission capabilities;
- coordinate regional environmental matters for the Marine Corps on the West Coast with Department of Defense and other service representatives; and
- educate appropriate federal, state, and local agency personnel.

The West Coast Regional Review Board includes representatives of all major Marine Corps activities on the West Coast, including the MAGTFTC Commanding General. The Natural Resources and Environmental Affairs Division representative on the Board is the NREA Division Head.

2.3 Other Federal Agencies

2.3.1 U.S. Department of the Interior

2.3.1.1 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) is responsible for ensuring that MAGTFTC complies with the Endangered Species Act. The USFWS-MAGTFTC partnership in the management of the desert tortoise will continue to be critical in FY 2002-2006 as the USFWS prepares a biological opinion on the desert tortoise at MAGTFTC in response to the MAGTFTC biological assessment. The USFWS is also the regulatory agency for permitting actions involving the handling of desert tortoises.

The USFWS, Region 1, has a field station at Ventura, California that provides technical advice and regulatory guidance for management of natural resources on the Combat Center, particularly endangered

[2] Charter of the Mojave Desert Environmental Policy and Planning Board.

and threatened species. The USFWS is a partner in the MDEP and other regional initiatives and cooperative ventures with the Combat Center.

The USFWS is a signatory cooperator in implementation of this INRMP in accordance with the Sikes Act. Appendix 2.3.1.1 contains specific items of agreement among the USFWS, California Department of Fish and Game, and MAGTFTC, as required by the Sikes Act.

2.3.1.2 National Park Service

Joshua Tree National Park may also be a useful partner in natural and cultural resource activities at MCAGCC. Its staff is working on xeric landscaping and desert land restoration. They also have cultural resources expertise. The Park and MAGTFTC exchange species lists, and members of NREA and National Park staffs co-chaired the Desert Lands Restoration Task Force of the Desert Managers Group in 1999-2000.

2.3.1.3 Bureau of Land Management

The Bureau of Land Management (BLM) manages much of the land surrounding the Combat Center (Section 3.14.3). The agency is an important partner in the management of natural resources and the sharing of pertinent databases. Access to training ranges across BLM land requires BLM approval (Section 4.9.2.1.7). BLM has lead responsibility for the West Mojave Coordinated Management Plan (Section 1.6). The BLM is a partner in the MDEP and other regional initiatives and cooperative ventures with MAGTFTC.

2.3.2 U.S. Department of Agriculture, Natural Resources Conservation Service

The Natural Resources Conservation Service has expertise in general land inventory and technical aspects of land restoration, that has been useful for MAGTFTC. The agency is completing a soil survey of the Combat Center to determine soil types, drainage characteristics, erosion potential, and the shrink-swell potential of each soil type.

2.3.3 Other Federal Agencies

Other potential federal partners for implementation of this INRMP include the Environmental Protection Agency, San Bernardino National Forest, U.S. Department of the Interior Bureau of Mines, National Aeronautics and Space Administration, and others that may be identified later.

2.4 California Department of Fish and Game

The California Department of Fish and Game (CDFG) is the primary State agency regarding fish and wildlife management at the Combat Center. In 1992 CDFG and MAGTFTC worked together to relocate a herd of 20 bighorn sheep in the Bullion Mountains on the Combat Center as part of a reintroduction program. CDFG, the Society for the Conservation of Bighorn Sheep, and MAGTFTC have formed a partnership for the monitoring of bighorn sheep and the development/maintenance of two water guzzlers on the Combat Center. The role of the CDFG in this project has evolved from the primary action agency

to project oversight.

The CDFG maintains a California Natural Diversity Database, that is useful for management of natural resources at the Combat Center. The agency also is responsible for maintaining a list of state-sensitive species that are found on the Combat Center. The CDFG is a signatory cooperator in implementation of this INRMP. Appendix 2.3.1.1 contains specific items of agreement among the CDFG, USFWS, and MAGTFTC, as required by the Sikes Act.

2.5 Universities

Various universities have cooperative research interests in Marine Corps lands. MAGTFTC is using universities to assist with research involving the desert tortoise. Current projects involve the University of Florida, Gainesville (tortoise diseases) and San Diego State University as well as the University of Nevada, Reno (reptile density and distribution).

The University of California, Riverside prepared the MAGTFTC Natural Resources Management Plan in 1993 and a draft *Desert Tortoise Management Plan*. San Diego State University studied the use of native plants in a revegetation program to restore the Vertical Short Takeoff and Landing site in the Sand Hill Training Area and the Mainside tank trail. These and other universities may be used during this plan period to assist MAGTFTC with specialized needs.

2.6 Contractors

Contractors are important to INRMP preparation and implementation due to declining Defense manpower while environmental requirements remain at relatively high levels. This is expected to continue during the next five years.

2.7 Other Interested Parties

Potential special interest co-operators that may have an interest in natural resource management at MAGTFTC include the California Native Plant Society, Society for the Conservation of Bighorn Sheep, Desert Protection Council, Mojave Desert Air Quality Management District, Society for Ecological Restoration, Bat Conservation International, and others that may be identified later. The Society for the Conservation of Bighorn Sheep maintains wildlife guzzlers in bighorn habitat on the Combat Center.

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3.0 AFFECTED ENVIRONMENT

3.1 Location and Neighbors

MCAGCC, Twentynine Palms, California is located in the Mojave Desert within the County of San Bernardino in Southern California. The base is approximately five miles north of the city of Twentynine Palms, 54 miles northeast of Palm Springs, and 150 miles east of Los Angeles. Several small communities are located in the Morongo Basin south and west of the base. In addition to Twentynine Palms, these communities include Joshua Tree, Yucca Valley, Morongo Valley, and Landers. The Combat Center's northern boundary lies three miles south of Interstate 40; the southern boundary is located about six miles north of Highway 62 (Figure 3.1, Location).

3.2 Acreage and Acquisition

A generally recognized acreage for the Combat Center is 596,257.97. However, this does not include three sections purchased from Catellus Corporation in the mid-1990s. Thus, the acreage now is 598,177.97 (or about 935 square miles)(LtCol Thelin, e-mail communication, 28 Jan 00).

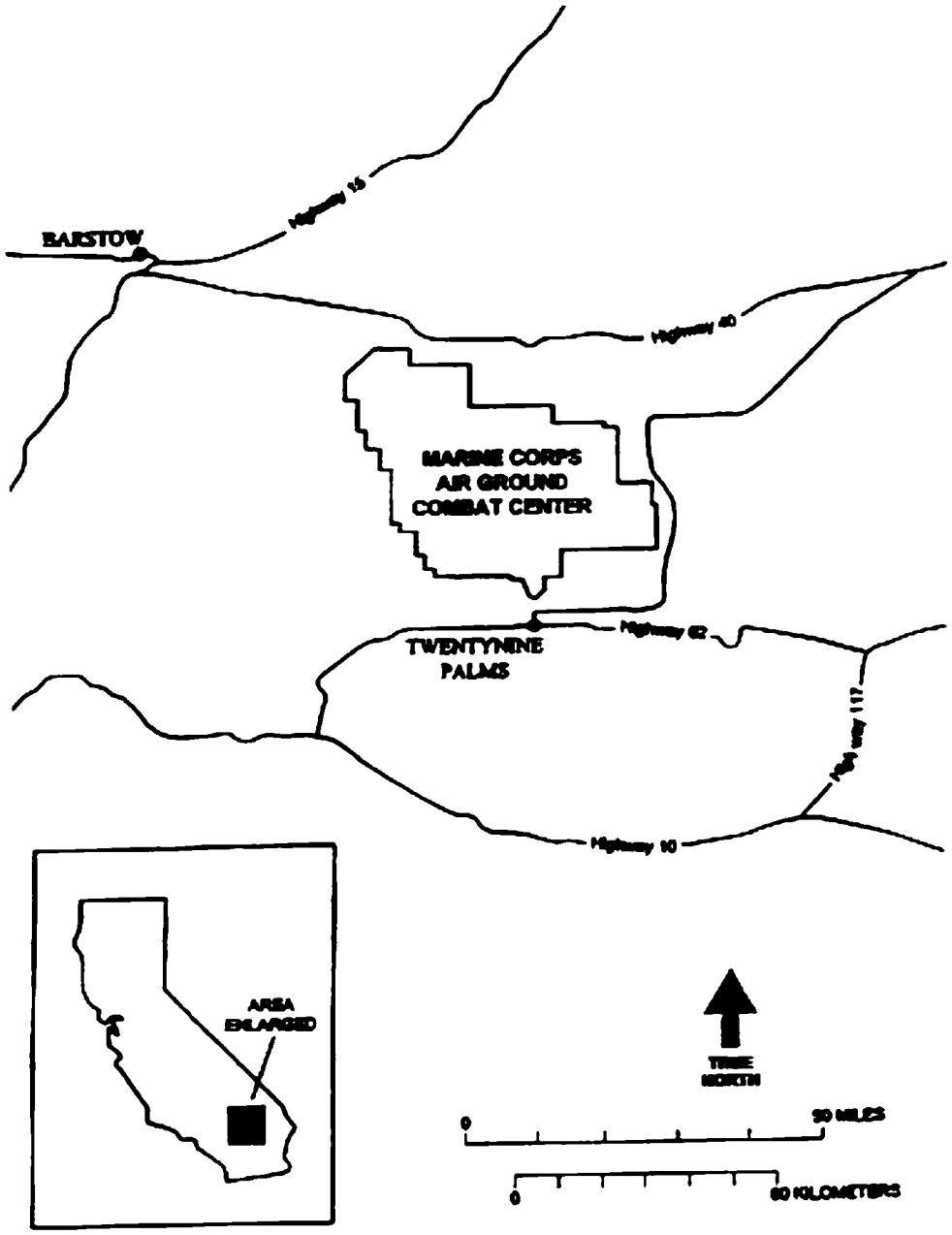
- In 1954 Public Land Order No. 985 withdrew 200 acres of public land for Department of Navy use as "an artillery and anti-aircraft weapons training area" (likely the area now used as Mainside).
- In 1959 Public Land Order No. 1860 withdrew either 443,000 or 472,000 acres (PLO and subsequent documents disagree) for use by the Department of Navy as "an artillery range and Fleet Marine force support training area in connection with the Marine Corps Training Center at Twentynine Palms."
- The Navy acquired 112,970.55 acres from the Southern Pacific Railroad.
- The Navy acquired 10,633.92 acres from other private land owners.
- The America Mine Training Area (about 8,000 acres of withdrawn and former railroad land) was once excessed back to BLM. BLM refused the attempted excess due to clean-up costs.
- In the mid-1990s the Department of Navy purchased 1,920 acres in the Lavic Lake area from Catellus Corporation.

3.3 Installation History

MCAGCC was originally used by the U.S. Army in 1941 as a glider training base known as Condor Field. In 1943 the Army Air Corps gave up control of the facility and contracted with the Twentynine Palms Air Academy for a one-year period to train fighter pilots. Traces of the now abandoned Condor Field are still visible from the Main Gate entrance into the Combat Center. In 1944 the Navy took control of the land and used it as a gunnery and bombing range until the end of World War II. In 1945 the property was placed in a caretaker status and transferred to the custody of San Bernardino County. It lay dormant for the next seven years.

With the development and production of larger and more sophisticated weapons, the Marine Corps needed

Figure 3.1: Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center Location[1]



[1] Jones & Stokes, Inc. (2000)

unencumbered, open space for training. The Twentynine Palms property was chosen as a suitable site and was activated as a Headquarters Detachment on 20 August 1952 (Camp Detachment Marine Corps Training Center). Since then, various land acquisitions have occurred. On 6 February 1953 the official title was changed to Marine Corps Training Center, Twentynine Palms. A total of 120 Marines were stationed at the Training Center during this period.

On 1 February 1957 the Training Center officially became a Marine Corps Base, the world's largest. In September 1967 the Communications-Electronics School was relocated to Twentynine Palms from San Diego and was renamed Marine Corps Communications-Electronic School (MCCES) on 2 February 1971. On 1 October 1978, the base was redesignated the Marine Corps Air Ground Combat Training Center, Twentynine Palms, California. The name was changed to Marine Corps Air Ground Combat Center on 16 February 1979. In October 2000, the Marine Corps Air Ground Combat Center became the designated installation for the Marine Air Ground Task Force Training Command.

In April 1980 the Combined Arms Command was activated to provide a command headquarters for the Fleet Marine Force units garrisoned at the Combat Center. On 16 May 1980 the Combat Center became the home for a Headquarters nucleus for the 7th Marine Expeditionary Brigade. On 17 December 1981 the Combined Arms Command was deactivated, and the 27th Marines (infantry regiment) Headquarters was reactivated at MAGTFTC to serve as the 7th Marine Expeditionary Brigade's ground combat element. The 27th Marines Headquarters was deactivated on 30 June 1987. The 7th Marine Expeditionary Brigade was incorporated into 1st Marine Expeditionary Force in September of 1991 and deactivated 31 March 1992.

3.4 Historic Natural Resources Program Development at MAGTFTC

Pre-1980

The history of natural resources at the Combat Center is sketchy before the 1980s. The first Multiple-Use Natural Resources Management Plan was signed May 3, 1976 by Brigadier General E.R. Reid, Jr.. At that time the Assistant Chief of Staff, G-4 was responsible to the Commanding General for environmental affairs and the development and management of the Integrated Multiple-Use Natural Resources Plan as well as originating and implementing natural resources management programs consistent with the military mission.

The Assistant Chief of Staff was filling the position of the Natural Resources and Environmental Affairs Officer as an additional duty. He conducted and coordinated the natural resources management program and monitored pollution abatement activities. Technical assistance was provided by the Public Works Department and the Base Facilities Maintenance Section. A Base Environmental Enhancement Committee was established to provide additional assistance to the Chief of Staff in carrying out a natural resources management program.

1980-Present

The second Long Range Multiple-Use Natural Resources Management Plan was submitted January 1, 1980 and was the first plan to include a Cooperative Agreement for the conservation and development of

fish and wildlife resources at the Combat Center. This agreement was jointly signed by the Combat Center Commanding General, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game.

The Head of the Installations Division, under the cognizance of the Director of Installation and Logistics, was responsible for the development and management of the Long Range Multiple Land Use Natural Resources Plan as well as originating and implementing natural resources management programs. The Facilities Officer (Assistant, Installations Division) was filling the billet of the Natural Resources and Environmental Affairs Officer. However, the Table of Organization allowed for a GS-11 environmental specialist to fill that position. As of January 1, 1980 that specialist was not on-hand and a change to the Table of Organization had been requested to allow billets of four environmental technicians to aid the specialist. The Natural Resources and Environmental Affairs Officer was still provided technical assistance by the Public Works Department and Base Facilities Maintenance Branch.

An Environmental Enhancement Committee was established to provide additional assistance to the Head, Installations Division and the Natural Resources and Environmental Affairs Officer. This committee consisted of the Director of Installations and Logistics, the Head of the Installations Division, the Natural Resources and Environmental Affairs Officer, the Game Warden, the Public Works Officer, the Facilities Maintenance Officer, and participating tenant commands. An Environmental Impact Review Board was also established to review environmental impacts of proposed actions and provide recommendations of environmental significance to action sponsors. This board had the same members as the Environmental Enhancement Committee.

In the early 1980s MCAGCC hired one environmental specialist to act as the Natural Resources and Environmental Affairs Officer and created a Natural Resources and Environmental Affairs Division under the Installations and Logistics Directorate. During the 1980s the program grew to four people (a combination of military and civilian slots) and the primary mission of the Natural Resources Division was wildlife and desert tortoise management. In 1993 the NREA Division became its own Directorate. In 1998 the NREA Directorate was returned to division status within the Installations and Logistics Directorate. Currently, there are 33 civilian and 10 military positions authorized.

3.5 Military Mission

3.5.1 Overview

MAGTFTC's mission is to develop and conduct the Combined Arms Exercise (CAX) Program and to support the tenant units aboard the base. MCAGCC provides training to over one-third of the Fleet Marine Forces (FMF) units and reserves during the annual 10 live fire CAXs, as well as numerous other training exercises. Below mission descriptions were taken from the Training Range Study (EDAW, Inc., 1994), as summarized in the 1996-2000 Multiple Land Use Management Plan (U.S. Marine Corps, 1996a). Updates were made as required, primarily using Snover and Kellogg (1999).

3.5.1.1 MAGTFTC Mission

3.5.1.1.1 Primary Activities

The primary mission and activities of MAGTFTC are to support:

- the following exercises and operations:
  CAX Program (10 annually),
  Fire Support Coordination Application Course (annually),
  Steel Knight exercise (annually),
  Desert Fire Exercise (twice annually),
  Desert Scimitar (annually),
  Tactical Air Control Party training (10 annually),
  Fallbrook and Barstow shoots;
- annual tank gunnery qualifications;
- independent air support training flights by Marine, Navy, Army, and Air Force aircraft;
- low altitude air defense firing exercises;
- air schools proficiency training;
- joint airborne-air transportability training and aerial delivery missions; and
- training needs and requirements of Marine Expeditionary Force tenant units located aboard the base.

Another important military mission at the Combat Center is the support of Marine Corps Communications-Electronics School (MCCES), which trains personnel in electronic fundamentals, operational communications, air control/anti-air warfare operations, and communications.

3.5.1.1.2 Training Activities

As defined for purposes of this section, training activities are individual physical actions conducted by troops or machines. An operation consists of a combination of individual physical actions/activities. Activities common to many operations/training exercises at MCAGCC fall into the following categories: vehicular; human; aircraft; weapons; or facilities. To assess the effects of training and operations on natural resources at the Combat Center, the following discussion provides the background to understand military training activities that occur at the Combat Center.

Vehicular Activities

Vehicles use the Combat Center's training ranges daily and are a crucial element in training and operational activities. This discussion focuses only on the vehicles that are used off primary and secondary paved roads or designated tracked vehicle crossings. All vehicles are capable of producing noise, dust, and compressed soil. As a result, vehicular use may impact natural resources at the Combat Center. This impact is dependent on many factors (*e.g.*, where, when, frequency). Vehicles using training ranges are categorized as follows:

- light wheeled vehicles include rubber tired vehicles with four tires (*e.g.*, sedans, jeeps, pickup trucks);

- heavy wheeled vehicles include multiple axle and/or more than four rubber-tired vehicles (*e.g.*, Light Armored Vehicles, trucks, personnel carriers); and
- tracked vehicles have non-rubber wheels or tracks (*e.g.*, tanks, Assault Amphibian Vehicles, Multiple Launch Rocket System launchers) (Note: Tracked vehicles are required to use concrete crossing pads in the asphalt paved roads to the north of Mainside when moving to and from training ranges).

Dismounted Activities

Dismounted activities are classified into two categories: individuals, seven people or less on foot; and groups, eight or more people on foot. Movement associated with a group of people can create greater noise levels and have more physical impact (trampling effects) on the land than the movement of individuals. Movement is often extensive in combat training situations, and training exercises typically involve accessing areas by foot and by vehicle. Training can include bivouacking.

Aircraft Activities

The following aircraft activities are conducted in Restricted Airspace R2501, as compiled from Restricted Area/Military Operations Area Utilization Reports (U.S. Marine Corps, 1990, 1991, and 1993): Alpha Strikes, Low Level Bombing, Rockets, Strafing, Close Air Support, Limited Ground Controlled Intercepts, Air Combat Maneuvers, Dissimilar Air Combat Training, Parachute Operations, Close in Fire Support, Target Marking, Forward Air Controller, Electronic Warfare, Visual Reconnaissance, Aerobatic Flights, Troop Inserts, Tactical Air Control Party, Medical Evacuation Support, Troop Lifts, Resupply, Low Altitude Training, Night Vision Goggle Training, Spotter of Artillery and/or Air Strikes, and Photo and Photoflash Runs (updated using Snover and Kellogg, 1999).

The following aircraft use MCAGCC (Snover and Kellogg, 1999):

Fixed-wing Aircraft		**Rotary-wing Aircraft**	
Designation	***Name***	***Designation***	***Name***
A-10	WARTHOG	AH-1	COBRA
F-14	TOMCAT	UH-1	HUEY
F-15	EAGLE	UH-60	Utility Helo
F-16	FALCON	CH-46	SEA KNIGHT
F-117	Stealth Bomber	CH-53	SEA STALLION
B-1	Bomber	-	APACHE
B-52	Bomber	-	BELL
FA-18	HORNET		
AV-8	HARRIER		
C-9	-		
C-12	-		
C-17	-		
C-130	-		
C-141	-		

Fixed-wing Aircraft

Designation	*Name*
KC-130	HERCULES
-	LEAR

Aircraft overflights generally have little direct impact on natural resources at the training ranges. Air ordnance delivery operations are conducted by both fixed- and rotary-wing aircraft. Most aircraft flights originate and/or terminate at the Expeditionary Airfield. Unmanned Aerial Vehicles operate from a facility near Assault Landing Zone Sand Hill.

Parachute drops of personnel and cargo mainly occur in the five designated Drop Zones (Jumbo, Giant Rock, Sand Hill, Joshua, and Yucca).

Ordnance Use

The use of air-to-ground ordnance (bombing and straffing) is an integral part of training and is characteristic of operations at the Combat Center. The manner of aerial ordnance delivery varies because of differences in aircraft, weapons systems, and missions. All fires are restricted within a 1,000-meter Combat Center boundary buffer zone and Acorn, Emerson Lake, Gypsum Ridge, Bullion, Cleghorn Pass, Range, East, West, Sand Hill, and Mainside training areas. Tank firing occurs in all or parts of Black Top, Lavic Lake, Emerson Lake, Quackenbush Lake, Gays Pass, Delta Corridor, Bullion, Lead Mountain, Maumee Mine, and Cleghorn Pass training areas. Fixed-range live-fire occurs on various ranges described in Section 3.6.5.

Digging and Miscellaneous Operations

Digging operations are described since they have potential to affect natural resources. Digging can range from simple operations (*e.g.*, foxholes, small arms emplacements) to large-scale operations (*e.g.*, tank traps, tank emplacements). Digging operations are generally in conjunction with other ground-oriented operations.

Training Exercises

Training exercises combine above individual training activities into events that test unit capabilities to coordinate activities with each other under real-world scenarios. Various live-fire exercises are conducted at the Combat Center each year, including the Marine Corps CAX, Steel Knight, Desert Fire Exercise (DESFIREX), and Desert Scimitar. In addition to these major exercises, many other types of smaller exercises and activities occur separately and sometimes simultaneously throughout the year. Major exercises occur about 70 percent of the year at the Combat Center, but other training fills out the entire year (Snover and Kellogg, 1999).

The *CAX* is a mechanized live-fire training exercise that combines the ground, air, and support forces of a Marine Air Ground Task Force, referred to as the exercise force. Objectives of the CAX are to:

- train units to synchronize air/ground fire in support of the warfare maneuver;
- exercise command, control, communications, intelligence, and fire support coordination of combined arms; and

- exercise the capability of each supporting arm to respond effectively to the requests of the supported unit.

The CAX force is composed of:

- a Headquarters Element consisting of a Regimental Headquarters;
- a Ground Combat Element normally consisting of one infantry battalion (approximately 800 Marines) reinforced by a tank company (14 M1A1 tanks) and an artillery battalion (18 howitzers);
- an Air Combat Element consisting of a fixed-wing squadron (approximately 12 F/A-18s or AV8Bs), an attack helicopter squadron (6-8 AH-1 Cobras), and a composite helicopter squadron (CH-46s and CH-53s) for transportation and heavy lift; and
- a Combat Service Support Element consisting of logistical equipment and personnel to provide supplies and repair services to the Ground Combat and Air Combat Elements.

The Tactical Training Exercise Control Group (TTECG) sets up various situations that require an exercise force to effectively coordinate a combined arms response. The CAX lasts approximately 22 days and is controlled by the TTECG using a building block approach. Training begins at the staff and unit level and culminates with a Final Exercise (FINEX) in which the entire Marine Air Ground Task Force participates, operating in the field 24 hours a day for a three-day period. Snover and Kellogg (1999) present (Table 2-9) a typical CAX schedule.

In addition to the primary events discussed below, the Ground Combat Element, Air Combat Element, and Combat Service Support Element conduct other unit-level training throughout the CAX. A general sequence of events for a CAX follows.

- Upon arrival at the Combat Center, TTECG reviews battalion operations orders and Standing Operating Procedures, and the exercise force receives an orientation including a program overview, general procedures, and classes in range safety.
- The Ground Combat Element commences field training on the Range 400 series. Infantry squads, platoons, and companies practice attacking enemy defenses using their organic weapons (*e.g.*, mortars, machine guns, etc.); no air or artillery support is provided.
- Range 410 is used for squad-level training that focuses on unit SOPs and battle drills. Range 410 Alpha is used for platoon-level training in tactics to be employed against an enemy strongpoint. Range 400 is used for company-level training, wherein the company commander employs all organic and attached weapons in a deliberate attack against an enemy strongpoint.
- Maneuver complexity increases during Mobile Assault Course exercises. During the Mobile Assault Course, a company-level attack and defense is performed in the Delta Corridor using infantry troops and mechanized equipment. The attack is supported by armor, artillery and mortars, fixed-wing aircraft, and attack helicopters. The Mobile Assault Course is movement under fire, with battle drills to include: breaching an anti-armor obstacle, mounted and dismounted attacks through an objective, synchronized planning, and employment of all assets (infantry, armor, artillery, and air fire).
- Air Support Coordination Exercises are conducted at the same time as the Range 400 series infantry troop training. During Air Support Coordination Exercises, Forward Air Controllers and artillery Forward Observers work together to bring coordinated aircraft and artillery fire on

enemy targets.

- Before conducting the final exercise, the exercise staff rehearses operations and refines tactical plans in the Combined Arms Staff Trainer, an indoor, electronic system that includes three-dimensional terrain boards of the various Combat Center exercise areas, a laser light system to simulate impacts on the boards, and communications/ electronic warfare systems simulators.
- The Fire Support Coordination Exercises (FSCEXs) involve maneuver commanders using forward air controllers and mortar and artillery forward observers for live air and artillery fire. FSCEX-1 is a company-level tactical exercise. The team attacks an enemy defense utilizing artillery, fixed-wing aircraft, and attack helicopter support. FSCEX-2 is a battalion movement-to-contact, live-fire tactical exercise. FSCEX-3 is a battalion delay and defend live fire exercise that emphasizes continuous fire support during rearward movements and a defense that properly trades space for time. FSCEX-4 and FSCEX-5 are conducted only during Enhanced CAXs when a regiment (two or three battalions) acts as the Ground Combat Element. The regimental command element coordinates subordinate elements during attack (FSCEX-4) and delay/defend (FSCEX-5) exercises.
- The FINEX is the culmination of the CAX. It is an exercise that brings together the tactics, techniques, and procedures developed during the previous training period. During the three-day FINEX, the Ground Combat Element, supported by the Air Combat Element and the Combat Service Support Element, execute numerous missions (attack, defend, delay) in a live-fire environment.
- Upon completion of the FINEX, the Tactical Training Exercise Control Group provides occupational specialty debriefs and a comprehensive general debrief covering all aspects of the exercise force performance.

Steel Knight, a live-fire training exercise, is a two-week event at the Division level. Steel Knight training scenarios change, but exercise events include: deliberate attack, counterattack, day/night deliberate defense, withdrawal, battlefield interdiction, direct air support, close air support, night tactical withdrawal, and withdrawal not-under-enemy-fire. Exercises also include aerial reconnaissance/ surveillance and long range artillery missions. Most training areas at the Combat Center are usually employed for Steel Knight. Major staging areas are Sand Hill, West, and East training areas (Snover and Kellogg, 1999).

DESFIREX is primarily an artillery training exercise that has recently been downgraded from a regiment to a two-battalion exercise. One DESFIREX exercise each year focuses exclusively on artillery unit training while the other also invites infantry, reconnaissance, and armored units. Army Multiple-Launch Rocket System units are also invited to the second type of DESFIREX. Other training schemes can include helo borne raids, Joint Air Batteries, and Unmanned Aerial Vehicles operations. DESFIREX can use most training areas. The heaviest artillery impacts areas are Quackenbush Lake, southern Gays Pass, Lead Mountain, and northern Bullion with moderate artillery firing into Black Top, Lavic Lake, Delta, and northcentral Lava training areas (Snover and Kellogg, 1999).

Desert Scimitar is a large exercise that emphasizes tank maneuvers with infantry and indirect artillery fire support, comparable to Steel Knight.

The ***Fire Support Coordination Application Course*** involves live-fire, mostly air- and artillery-delivered in Delta, Quackenbush Lake, and Prospect training areas, and non-live-fire in Gypsum Ridge Training

Area (Snover and Kellogg, 1999).

The ***Tactical Air Control Party Course*** involves considerable live-fire air support, occurring 10 times annually. This course is conducted in the Quackenbush Lake training area, but Lava and Lead Mountain training areas have been utilized in the past.

The ***Fallbrook Shoot*** is variable and occurs when the Naval Ordnance Center, Pacific Division, Fallbrook bring a large amount of ammunition, fuses, or propellants that have an expired shelf life. If test shoots show the materials safe, the MCAGCC artillery unit shoots it whenever and wherever it can be scheduled.

The ***Barstow Shoot*** is used to test howitzers that have been rebuilt by the Marine Corps Logistics Base, Barstow. This shoot is conducted in the southeastern portion of Delta Training Area.

3.5.1.2 MCAGCC Population and Major Troop Units

MCAGCC tenant units are:

- 7th Marines Regiment (Reinforced) (Infantry),
- 3rd Battalion, 11th Marines (Artillery),
- 1st Tank Battalion,
- 3rd Light Armored Reconnaissance Battalion,
- Delta Company, 3rd Amphibian Assault Battalion,
- Marine Unmanned Aerial Vehicle Squadron-1,
- Combat Services Support Group-1,
- Marine Corps Communication-Electronics School,
- Navy Hospital, and
- Marine Wing Support Squadron 374.

Transient units that schedule training at the Combat Center include Marine Corps, Air Force, Army, and Navy units (Snover and Kellogg, 1999).

Active duty military personnel assigned to the Combat Center include 11,636 Marines supported by 1,627 civilian personnel. There are 9,247 military dependents. About 50,000 Department of Defense military personnel annually train during CAX and other exercises at MCAGCC, and an additional 7,000 Marines train at the MCCES.

3.5.1.3 Anticipated Changes in Military Mission

3.5.1.3.1 Training Land Use Intensity

The mission will continue to evolve and may increase in scope to meet increasingly complex, worldwide commitments of U.S. Marine Corps forces. Training areas that are already near scheduling capacity or difficult to access will likely experience only light increases in use. Some training areas could experience increases in use, especially with the recent training area boundary realignments. A pending Military Operations Area for the Giant Rock restricted airspace adjacent to the Combat Center to the west would result in increased use. The closing of other training ranges in the United States (Base Realignment and

Closure) has resulted in consolidation of training at remaining installations, which could increase use of the Combat Center (Snover and Kellogg, 1999).

3.5.1.3.2 Unit Changes

There are no projected significant unit changes for the tenant units at the Combat Center. However, inherent to the installation's mission, visiting training units will continue to come from military installations throughout the Marine Corps, emphasizing the West Coast, as well as from other Service branches. In recent years Reserve Component units have played an increasingly important role in America's military strategy.

3.5.1.3.3 Training Scenario Changes

The Combat Center revises training exercise scenarios to better prepare Marines for changing world conditions and threats. This process, to some degree, will always be ongoing. Such changes in training scenarios can change impacts of training on the environment.

3.5.2 Relationships Between Natural Resources and the Military Mission

Marines need to train in the kind of environment that they can expect to see in combat. In order to do that, the training environment must be maintained in as natural condition as possible.

The Combat Center comprises approximately 935 square miles on the southern edge of the Mojave Desert. This area is characterized by mountainous terrain with steep slopes and deep dissected alluvial fans. The large valleys are used for combined arms maneuvers with relatively vehicle-inaccessible mountains and rough terrain (*e.g.*, lava flows) separating these maneuver corridors.

The entire desert ecosystem is extremely fragile. Soils develop very slowly in harsh desert environments and may not be replaced for centuries following disturbance (Phillips, Brandt, and Reddick, Inc., 1981). Desert soils are extremely vulnerable to disruption, and once disturbed, can be easily eroded by wind and water. Desert soils are also highly vulnerable to compaction. Plant recovery depends on the amount of rainfall, frequency, and seasonable conditions. Main supply routes, which often follow washes and are necessary for rapid deployment of equipment and personnel, are subject to flash floods, especially following intense summer storms.

3.5.2.1 Compatibility Issues

The purpose of this section is to identify potential conflicts between the conservation of natural resources and the military mission and the means to offset adverse impacts and sustain the use of these resources. Potential conflicts may be spatial, temporal, or residual/indirect in nature. Spatial conflicts may occur when areas within the Combat Center contain natural resources that limit military use, when military activity disrupts a critical natural resource, or when more than one natural resource occurs within an area resulting in different management objectives. Temporal conflicts may occur when two parties intend to use an area at the same time or when planned uses are not optimized with respect to biological issues (*e.g.*, activity periods of protected species). Residual/indirect conflicts may occur when incidental noise, pollution, and fugitive dust, for example, have an effect on natural resources or their planned use.

Because military training is the primary impact on the Combat Center's natural resources, efforts are made to minimize these conflicts. Occasionally, conflicting military goals and conservation requirements preclude military activities at specific locations (*e.g.*, reduced military training options in Sand Hill Training Area due to the importance of the installation's water supply as well as cultural resources and desert tortoise). This INRMP and other management plans address these conflicts. The following methods have been developed to avoid and minimize potential and existing conflicts.

Vegetative Resources

The Combat Center has areas that are relatively pristine. In general these areas are inaccessible to vehicular traffic, areas that are isolated, or have little value in the current training scenarios.

Certain types of landscape are more heavily affected by the military mission than others. In general, valley floors and wide flats can be disturbed by vehicular travel and maneuver, both wheeled and tracked. More rugged areas may be disturbed by direct shell and bomb impacts. However, higher reaches of mountains and certain canyons are not affected by military activities at all. Wildfires are not a serious problem at present, even in more heavily vegetated regions (see Section 4.12, Wildfire Management for a discussion of potential increase in wildfire disturbance due to exotic grasses invasion). Obviously, most disturbance is associated with maneuver, not shelling and bombing.

The majority of the Combat Center's land is undisturbed. Disturbance is directly related to accessibility. In general, highly accessible areas are far more disturbed than other areas. Other areas of heavy disturbance are natural travel corridors where a variety of training scenarios may be implemented.

Desert Tortoise and Other Listed Species

The Federal Endangered Species Act of 1973, as amended, requires lands under the jurisdiction of the Marine Corps to conserve listed species. As defined in the Act, conservation is the use of all methods and procedures necessary to bring any listed species to the point where protections provided by the Act are no longer necessary. Section 7 of the Act requires the Marine Corps to formally consult and confer with the USFWS if any action by MAGTFTC may affect a listed species. Pursuant to these requirements and the presence of the federally-listed desert tortoise (*Gopherus agassizii*) on the Combat Center, the Marine Corps has engaged in formal consultation with the USFWS to develop measures to avoid and minimize impacts to the desert tortoise.

MAGTFTC has prepared a Biological Assessment (Snover and Kellogg, 1999) of the effects of training and land use at the Combat Center on the desert tortoise. This assessment will, in turn, be used by the USFWS to issue a Biological Opinion, that will identify the terms and conditions under which the Marine Corps may operate on the Combat Center while remaining in compliance with the Act. As such, potential conflicts between desert tortoise conservation and MAGTFTC use of training lands are being addressed.

Cultural Resources

An Integrated Cultural Resources Management Plan is being developed to address conflicts between numerous cultural resources found within the Combat Center (identified and as yet undiscovered) and the

military mission. Section 5.4 discusses the protection of cultural resources as related to implementation of this INRMP.

3.5.2.2 Effects of the Military Mission on Natural Resources

There are positive effects of the military mission on natural resources. Poaching and other illegal activities that potentially affect wildlife resources are relatively insignificant because of the military presence. Human development, potentially devastating to natural resources, is minimized by the military requirement for undeveloped lands.

The most positive benefit of the military mission at the Combat Center on natural resources is retaining the vast desert ecosystem and open space, conservation resulting in more abundant species numbers and diversity for the region, and the MAGTFTC commitment to natural resources management. This natural resources commitment is beneficial to natural resources in general and the people who use areas around the installation boundary.

Krzysik and Trumbull (1996) discuss military training impacts on natural resources in some detail using many references. This discussion includes direct disturbance to soils, direct disturbance to vegetation, direct disturbance to wildlife, indirect disturbance to wildlife, noise and vibration, and smokes and obscurants. Their study indicates that the military mission has potential to cause disturbance to MCAGCC natural resources.

Rowlands (1980) edited a BLM paper entitled *The Effects of Disturbance on Desert Soils, Vegetation and Community Processes with Emphasis on Off Road Vehicles: A Critical Review*. This collection of scientific papers makes several points pertinent to the effects of the military mission at the Combat Center.

- Off-road vehicle (ORV) use will reduce perennial plant cover and above ground biomass. The degree of loss is dependent on intensity of use.
- A reduction in perennial plant density often occurs in ORV use areas, especially in areas of moderate to heavy use.
- In areas of extensive use by ORVs, smaller shrubs are often the first to be disturbed or eliminated which tends to reduce overall plant density.
- Annual species are affected in much the same way as perennials except that slight disturbances may cause no measurable difference with regard to either annual or perennial plants, and may, in fact, show some increases in cover and/or diversity.
- Changes in the plant community are directly related to intensity of use and environmental factors.
- Some perennial plants can recover from some ORV impacts.

Unlike ORVs, military use differs in the fact that maneuvers are planned and controlled actions. In areas of moderate to heavy military maneuver on the Combat Center, the density and diversity of both perennial and annual plants decreases in more or less direct relation to the intensity of use. Other heavier potential effects are similar to those noted by Rowlands (1980) with regard to ORV use of other desert lands.

There are two potential effects of the military mission on the Combat Center natural resources, impact

disturbance and maneuver disturbance. Impact disturbance results from live-fire ordnance delivered by aircraft and ground sources. Maneuver disturbance occurs during mechanized maneuvers when heavy tracked and wheeled equipment moves across the landscape and bivouac sites are established. The activities could injure or kill wildlife, disturb or damage soil structure and plants, and generate considerable dust.

Most measured disturbance at the Combat Center occurs in valley floors. Potential effects of the military mission on the desert vegetation of the Combat Center include a reduction in shrub densities; impaired growth, leaf and root injury; reduction in annual and perennial species; and mortality. Potential effects of the military mission on wildlife include possible death or injury from direct contact with vehicles or munitions.

Air-to-ground and ground-to-ground live-fire training and maneuvers will continue to cause most of the disturbance to natural resources on the Combat Center in those few areas that are heavily disturbed. This disturbance is cumulative and is intensified with repeated long-term use. It should be noted, however, that recent studies show that increased rainfall along with restricted use results in fairly rapid revegetation.

Disturbance to native desert ecosystems can create conditions that are ideal for invasive species (Brooks 1999). For example, exotic weed species are increasing in some disturbed areas, and these weeds directly and indirectly compete with native plants and wildlife dependent upon these plants. On some areas of the Combat Center, invading plants may be increasing the ground cover density to the point where the wildfire potential will increase.

3.5.2.3 Effects of Natural Resources or Their Management on the Military Mission

The MAGTFTC command and staff are determined to complete the military training mission successfully, and an integral part of that mission is good environmental stewardship. However, there are some negative aspects of natural resources or their management on military training. The MAGTFTC's management strategy is to minimize natural resource impacts while maximizing land use for military training.

The legally mandated requirement to protect and promote the recovery of the desert tortoise occasionally requires conflict resolution. MAGTFTC is also required to protect cultural resources and water supplies, but these management issues are not the focus of this INRMP.

There are environmentally sensitive areas identified in Combat Center Order (CCO) 5090.1B that are not limited to training at this time. These are recognized by MAGTFTC as areas that could become access-limited if natural and cultural resources are placed at increased risk due to military training activities.

3.5.3 Future Military Mission Impacts on Natural Resources

Section 3.5.1.3 indicates that the military mission will continue to evolve and may increase in scope at the Combat Center. These changes will influence natural resources and the challenges of managing these resources to meet growing regulatory and stewardship requirements.

Impacts of a growing military mission at the Combat Center on natural resources are expected to be similar to those experienced at the Combat Center today. The challenge for natural resources managers at MAGTFTC is to respond to these impacts with an equally effective disturbance minimization and mitigation program.

3.6 Facilities

The physical plant at MCAGCC consists of a full range of facilities, roadways, and utility infrastructure. The roadway system and infrastructure adequately serve Mainside. Both utilities and roads have been expanded since the base's initial development. Utility systems include non-potable water distribution, potable water distribution, sanitary sewer system, sewage disposal, electricity, high temperature hot water distribution, and natural gas distribution. Utility systems are in good condition.

3.6.1 Mainside

Most improvements are within Mainside, a six-square mile area in the southern portion of the base. Buildings and infrastructure date to the Marine Corps activation of the base as a headquarters detachment in 1952.

3.6.2 Transportation System

3.6.2.1 Regional Access

Regional access to the Twentynine Palms area is provided by Twentynine Palms Highway (State Route 62), a four-lane highway that runs east-west from Interstate 10 (near Palm Springs) to the city of Twentynine Palms, south of the base. Local access to and from the base is provided primarily via Adobe Road. All visitors and all large vehicles (with more than two axles) must enter and exit through the Main Gate on Adobe Road. In addition to the Main Gate, there are two auxiliary gates open for two-axle vehicles and buses for limited times during the day.

3.6.2.2 Main Supply Routes

A separate network for military track and wheeled vehicles connects Mainside with the Training Ranges. This network is intended to keep heavy vehicles off of asphalt roads and restrict crossings on Del Valle Road to areas reinforced with concrete. Main trails are along First and Tenth Streets, the evaporation ponds, and along Del Valle Road to the ranges.

Vehicular circulation throughout the Training Range primarily occurs on unpaved Main Supply Routes (MSRs). MSRs average 32 feet wide. About 0.2% of the Combat Center is used for 354 miles of MSRs. In 1997-98 major work was done on MSRs by placing decomposed granite in problem areas to reduce erosion. Summer flooding in 1999 removed much of this road hardening in some areas. Most of this disturbance has been repaired. MAGTFTC is preparing to surface about 0.25 miles of the MSR between Mainside and Rifle Range Road and about 0.5 miles from Mainside toward Mountain Pass to the east.

3.6.2.3 Secondary Roads

There are about 665 miles of secondary, dirt roads on the Combat Center that average 16 feet in width and cover about 0.2% of the total land area. The secondary road system gradually evolved to meet the needs of the evolving military mission (Snover and Kellogg, 1999).

3.6.3 Water

Ground water, extracted from wells, is the primary source of water for the region. Water levels in wells located throughout the region range from near the surface to more than 500 feet below surface. Several wells are located in the training range.

The sole source of MCAGCC potable water is an 11-well system within the Surprise Spring Subbasin in the Sand Hill Training Area. The Surprise Spring Subbasin was first used by Native Americans and then settlers until it became part of the Combat Center in the 1950s. Ground water pumping has caused water levels to drop as much as 100 feet near Surprise Spring. An original estimate of the amount of ground water available in the top 200 feet of the spring was 812,000 acre-feet. Approximately 66,500 acre-feet were removed from 1953 to 1985. The total amount of remaining potable water is unknown. Recharge of the Surprise Spring Subbasin is minimal to non-existent with the primary source of any recharge being the San Bernardino mountains to the southwest.

The U.S. Geological Survey developed a digital model to determine long-term availability of ground-water in the Surprise Spring Subbasin. Water use from 1985 through 2035 was estimated using a projected base population increase of 4,600 people. The results of the study showed an annual increase in acre-feet of water used from 2,900 to 5,300 through 1991 and then remaining stable to 2035. The total pumpage during that period was estimated at approximately 257,500 acre-feet.

According to the Water-Resources Investigations Report 84-4119 by J.P. Akers (1986), an additional 979,000 acre-feet of good quality water is estimated to be stored in the Surprise Spring Subbasin between 200 and 600 feet. Although water supply is present at these depths, it may be difficult and economically infeasible to extract water stored in this zone.

Recent calculations indicate 125-150 years of potable water remaining. However, the U.S. Geological Survey is studying the issue of declining water quality due to aquifer drawdown. The Survey report will include recommendations for long-term management of the aquifer.

If water demand increases, limited supplies could be obtained by using standby supply wells in Deadman Lake Subbasin. This water is high in fluorides, arsenic, and dissolved solids of sulfates and boron; however, it can be used if treated and then blended with water from Surprise Spring.

A study was also done by Koehler (1983) that evaluated the feasibility of obtaining ground water in the northeastern part of the Combat Center (Bagdad area) for use during field maneuvers. Five test holes were drilled (three were cased and completed; two were abandoned). The three wells studied yielded an estimated 100 gallons of water per minute. An estimated 640,000 acre-feet of ground water is in storage west of the Ludlow fault. The study concluded that the water in storage and a small amount of annual

recharge, would provide enough water in the three wells for many years to come.

3.6.4 Wastewater/Stormwater Retention Ponds

Since 1996 MAGTFTC has been implementing a program to eliminate all industrial stormwater discharges to desert playas. This program uses a series of stormwater conveyance and retention systems that preclude the entry of potentially polluted stormwater from entering the environment (U.S. Marine Corps, 1997).

All treated, domestic wastewater must be disposed of within the boundaries of the Combat Center. This process is required and controlled by the Regional Water Quality Control Board. This requirement means that all treated wastewater at the Combat Center must be disposed through solar evaporation or irrigation. Although the oxidation basins do not have impermeable synthetic liners, the impermeable clay cap on the Mesquite Lake bed effectively prevents percolation.

Both wastewater from treatment facilities and stormwater runoff are collected in separate retention ponds.

- Some recycled water is stored in two ponds (12 million gallon capacity) near the golf course for golf course irrigation.
- There are three active detention ponds at the Mainside Waste Water Treatment Plant.
- Overflow from these three detention ponds enters four storage ponds, that retain water during winter for summer use.
- The seven ponds associated with the Treatment Plant have about 40 acres.
- There are two primary treatment ponds near Camp Wilson, that are scheduled to be upgraded to a conventional treatment system to improve the quality of treated water.
- A primary stormwater retention pond contains civilian industrial runoff (*e.g.*, gas station, automobile hobby shop). This pond has a wildlife viewing area.
- There are three other industrial stormwater retention ponds for military-related runoff, that are generally dry except after significant rainfall.
- Camp Wilson has a stormwater retention basin.

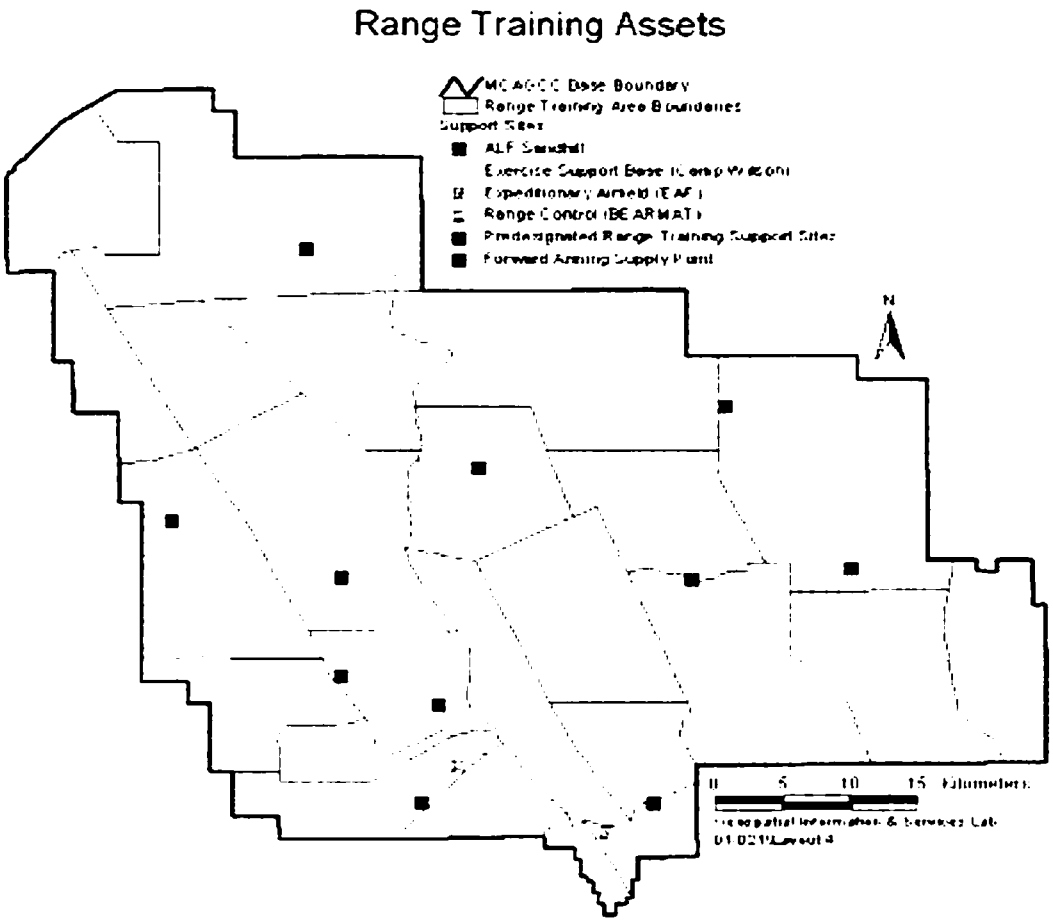
These detention ponds are extremely important to biodiversity of wildlife species at the Combat Center (Section 3.13), and they have value for educational purposes.

3.6.5 Permanent and Expeditionary Facilities

MAGTFTC training facilities are, for the most part, expeditionary. Expeditionary training facilities are temporary to provide a realistic replication of a combat situation (Figure 3.6.5, Training Range Assets).

The ***Expeditionary Air Field*** (EAF) is a temporary support base for the Aviation Combat Element of Marine units engaged in CAXs. The EAF is approximately eight miles northwest of Mainside and straddles both Sand Hill and West training areas. The EAF has an 8,000-foot, aluminum matting runway, aircraft parking area, tactical airfield fuel dispensing system, expeditionary control tower, weather facilities, and crash/fire/rescue services.

Figure 3.6.5: Marine Corps Air Ground Combat Center Range Assets



The ***Exercise Support Base*** (Camp Wilson) supports deployed units during CAX operations. The Exercise Support Base is northeast of the Expeditionary Air Field and lies partially within both Sand Hill and West training areas. Permanent facilities include a fire station, a field kitchen, an all-ranks club, an exchange, showers, a fitness center, a telephone center, laundry, and chapel. Temporary facilities consist of K-span billeting structures, maintenance, and administration facilities.

The ***Field Ammunition Supply Point*** is near Camp Wilson. It is used to stage ammunition for field exercises.

Predesignated Range Training Support Sites (formerly called forward arming refueling sites, forward logistics bases, field mess halls, shower units, etc.) are combat support sites in more-or-less permanent locations as an alternative to these sites being established at will by units as part of their exercises. Predesignated Range Training Support Sites have excavation and other ground disturbance (*e.g.*, fuel containment berms, parking, bivouac sites). MAGTFTC has nine of these training support sites strategically located throughout the following the Combat Center training areas:

- Cleghorn Pass,
- East,
- Emerson Lake,
- Gypsum Ridge,
- Lavic Lake,
- Noble Pass,
- North Lead Mountain,
- Quackenbush Lake, and
- South Lead Mountain.

The use of predesignated sites compared to other options for providing for such combat and service support activities was evaluated using NEPA (Templeton, 1997).

The ***Assault Landing Zone***, an unimproved dirt airfield, is in Sand Hill Training Area. The airfield runway length is 5,000 feet and qualifies for Air Force C-130 aircraft.

Drop Zone Sandhill, about one kilometer southeast of Assault Landing Zone Sandhill, is a designated drop zone at MCAGCC for personnel and cargo parachute drops. Parachute drops are permitted in other parts of the training areas, but are not recommended due to the danger of large obstructions that could injure parachutists.

There are 16 frequently used helicopter ***landing zones*** at the Combat Center. Twelve landing zones are scattered throughout the Training Range, and four are at Mainside.

There are 14 ***observation posts*** located on strategic high points throughout the training areas for use by Tactical Training Exercise Control Group, communication and command units for training exercises. These areas are designated as no fire and/or maneuver areas.

Range Control (call sign BEARMAT) consists of a building for personnel and antennas and a control

tower at Mainside. Range Control's mission is to monitor radio frequencies to maintain positive control and management of the Combat Center range/training areas and restricted air space. This includes R-2501 and the two Military Operation Areas, which are Special Use Airspace under FAA control that may be activated by MAGTFTC for military use. Range Control is responsible for ensuring that unit maneuver areas are not in other unit's impact areas. Specifically, it coordinates with the Federal Aviation Administration and the EAF Control Tower; advises all units of other unit activities, monitors activities, notifies appropriate authorities in case of a medical evacuation, and gives clearance to arrivals and departures of aircraft using landing zones at Mainside.

Seven ***repeater towers*** for radio communications are on various mountain tops throughout the Training Range. These repeater tower sites are within fiberglass shelters and are powered by solar and/or battery energy.

Fixed Ranges

There are 22 fixed, numbered ranges (about 16,000 acres with overlap among ranges) aboard MCAGCC. These ranges are described (EDAW, 1994) below with modifications to this list and greater detail in Snover and Kellogg (1999):

Range 100, Squad Maneuver Range, is a land navigation range.
Range 101, Tank, Main Gun Training Range (Miniaturized Scale), is designed for armor units to fire subcaliber training devices at scaled targets; also used for small arms fire.
Range 102, Squad Maneuver Range, is a land navigation range.
Range 103, Squad Defensive Fire Range, is designed to improve squad defensive tactics by incorporating changing deployment requirements and scenarios.
Range 104, Anti-Mechanized/Grenade Range, is designed to develop confidence of unit members in their abilities to use grenades and special weapons.
Range 105, Gas Chamber, is designed to train units in the use of CS gas and to develop confidence of unit members in the use of gas masks.
Range 106, Mortar Range, is used to practice firing live mortars.
Range 107, Infantry Squad Battle Course, is a live-fire range that incorporates quick reaction scenarios, such as ambushes, raids, and reconnaissance.
Range 108, Infantry Squad Assault Range, is designed to improve offensive tactics during changing deployment requirements and scenarios.
Range 109, Anti-Armor Live-Fire Tracking Range, is designed primarily for use by DRAGON or TOW weapons systems.
Range 110, MK-19 Range, designed to train use of the MK-19 machine gun.
Range 111, Military Operations in Urban Terrain (MOUT) Assault Course, is under construction. It will train units for MOUT operations and will feature automated stationary and moving targets.
Range 112, Explosive Ordnance Disposal (EOD) Demolition Range, allows is restricted for use by MCAGCC EOD units to destroy dud and Grade III ordnance, as well as train with and test special EOD tools and equipment.
Range 113, Multi-Purpose Machine Gun Range, is designed to train units in the offensive and defensive employment of all machine gun systems in the Marine Corps inventory.
Range 114, Combat Engineer Demolition Range, designed to accommodate mine and countermine

operations at the company level and can be used for demonstrating protective, tactical, point, interdictions, and simulated mine fields.
Range 400, Company Live-Fire and Maneuver Range, is designed to provide a rifle company the opportunity to conduct a live-fire attack on enemy strongpoints.
Range 410, Platoon Live-Fire and Maneuver Range, is designed to provide the opportunity for a rifle platoon to attack enemy positions and practice wire breaching and trench clearing procedures.
Range 410 Alpha, Rifle Platoon Attack, is designed to provide the opportunity for a rifle platoon to conduct a minefield breach and a dismounted, live attack against a hastily defending enemy squad.
Range 500, Armor Live Fire and Maneuver Range, provides the site and supporting facilities for armor and anti-armor training.
Range 601, Super Sensitive Fuse Impact Range, is restricted to only critical fuse ordnance that can be delivered by indirect fire weapons or aircraft. This range has been closed to sensitive fuses since 1995.
Range 605, Helicopter Door Gunnery Range, is used by aircraft crews to train in the firing of machine guns and rockets.

Laser Ranges

Fifteen training areas contain ***Laser Target Areas***, that are used for laser ground-to-ground and air-to-ground firing. Strict regulations and guidelines are enforced to prevent exposure to hazardous levels of laser radiation.

There are various ***Training/Low Power Laser Systems***. A few examples include the Multiple Integrated Laser Engagement System, Air to Ground Engagement System/Air Defense, and the Near Infrared Pointers and Signaling Devices. A brief description of each system is described below:

- The ***Multiple Integrated Laser Engagement System*** is a system for scoring tactical exercises by emitting infrared beams from each weapon that are then detected by target sensors fixed upon a person or a vehicle. These devices do not present a hazard at normal operational (engagement) distances.
- ***Air to Ground Engagement System/Air Defense*** emits an infrared laser beam to simulate various air defense and airborne weapons systems to improve realism during training. Air-to-ground laser firing also utilizes the land as its backstop.
- The ***Laser Evaluator System*** is used by air or ground units. When illuminated by laser beams, the system emits a low power signal back to the pilot or unit, verifying that it was struck by a laser.

Targets

Permanent Targets

The Training Ranges have two types of permanent automated target systems, the ***Infantry Remote Engagement Target System*** (pop-up Stationary Infantry Targets and pop-up Moving Infantry Targets attached to aluminum rails) and the ***CAX Target System***, located throughout training areas. Additional permanent targets are also located throughout training range areas but are not automated. These targets are either stationary plywood (presenting a tank or other military target silhouette), stacks of tires, or old

military vehicles.

The CAX Target System is an automated target system consisting of stationary pop-up armor targets (***Target Holding Mechanism-Tank Gunnery***). There are 172 stationary pop-up armor targets (some planned and others under construction) throughout the training areas and at three ranges. The CAX Target System is designed to support training of tank gunnery personnel and anti-tank Marines in identifying and firing on hostile targets. The CAX Target System is expected to increase dramatically with an increase of approximately 243 new Target Holding Mechanisms in seven training areas.

Laser Targets

Two types of laser targets (15 training areas) used at MCAGCC consist of the ***Simulated Laser Target*** (provides a laser splash when aimed at an object or point on the ground; aircraft and other instruments capable of identifying laser targets register the splash to complete their warfare exercises) and the ***Mobile Independent Target System*** (uses a strobe light system to determine hits and misses on vehicular targets) used for laser ground-to-ground and air-to-ground firing.

Small Arms Remote Target Systems are portable, remote, radio-controlled marksmanship trainers designed for outdoor, live-fire ranges. Their main purpose is for honing battle skills, reaction times, and small arms firing techniques in all-weather, day or night exercises.

3.6.6 Training Area Maintenance

Explosives ordnance personnel and engineers sweep and repair/replace targets at the end of each CAX in order to minimize unexploded ordnance, increase safety, and minimize negative impacts to the environment. Other maintenance is done after each major exercise. In addition, target maintenance is done throughout the year on fixed ranges and other locations. Maintenance includes upkeep on firing berms for tanks on Fixed Range 500, tank trap maintenance, and repair to other berms and trenches as required.

3.6.7 Projected Changes in Facilities

Mainside will continue to expand and develop within the vacant land available. As new military vehicles are developed and acquired by MAGTFTC, facilities to support their use will be required. Storage, supply, and administrative facility needs will increase as the military mission increases in tempo (Section 3.5.3). New buildings will be sited on lands already cleared (Snover and Kellogg, 1999).

Facility changes are accomplished using a master planning process at the Combat Center. This process is used to identify existing land use incompatibilities and conflicts and establish a framework for future facility siting and land development. The proposed land use plan is a synthesis of existing conditions, proposed projects, probable land area needs based on increased loading projections, and efficient, orderly, and functional interrelationships between uses. MAGTFTC will use its master planning process to accomplish the following facility development goals:

1. Re-utilize and convert existing facilities where possible to satisfy planning requirements due to the

limited Military Construction environment.
2. Propose specific projects to alleviate deficiencies and to accommodate future requirements.
3. Demolish and replace inadequate facilities.
4. Consolidate similar functions where feasible, while avoiding major alterations to the existing land use pattern.
5. Continue to be a vital link in providing training to one-third of the Fleet Marine Force and Marine Reserve Units during a series of 10 live-fire CAXs and numerous other training exercises.
6. Continue to host a variety of tenant activities.
7. Continue to incorporate state-of-the-art training range technology.
8. Maximize use of financial resources.
9. Reduce facility maintenance costs.
10. Optimize the capacity of training operations.
11. Promote functional efficiency of facilities and real estate.
12. Ensure ease of vehicular and pedestrian circulation.
13. Promote protection of environmental resources and energy efficiency.
14. Optimize quality of life.

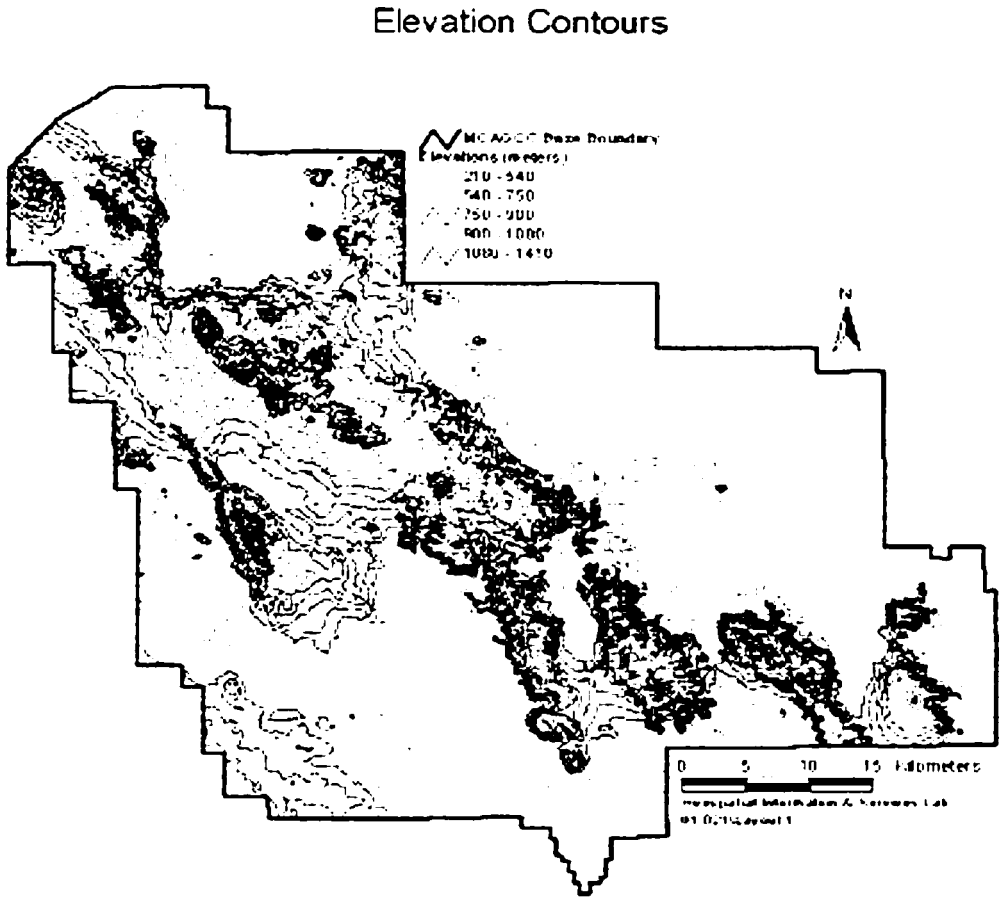
3.7 Topography

The Combat Center is located in the Mojave Desert, a part of the larger Basin and Range Physiographic Province, at the western base of the Bullion Mountain Range. Its terrain is characterized by alternating rocky uplands with slopes up to 90 percent and low valleys with broad alluvial plains, washes, and dry lake beds. Ancient lava fields are significant features of some training areas. Most of the terrain lies on the intermontane basin between 1,500 and 3,000 feet above mean sea level (Figure 3.7, Topography).

The Training Range is composed of numerous mountain ranges and valleys running parallel along a northwest/southeast axis. Several volcanic craters are in the general proximity of the training range; Amboy Crater and Pisgah Crater (just outside of MCAGCC) are the most dramatic. Sunshine Peak Crater lies within the Sunshine Peak Training Area. Numerous lava flows are present in the training range. The highest elevation in the training range is 4,699 feet at OP Round in the Bullion Mountains, and the lowest is 604 feet at Dry Lake in the Lead Mountain Training Area. Most MSRs traverse valley floors. A major topographic feature within the Combat Center is Hidalgo Mountain, a region-wide landmark.

Mainside is bounded on the east by the Bullion Mountains and the west by Mesquite Dry Lake. Mainside elevations vary from 760 to 2,580 feet with slopes up to 90 percent. Most Mainside facilities are constructed on the alluvial fan west of the Bullion Mountains between the 1,800- and 1,880-foot contours. The terrain generally slopes westward with slopes up to 15 percent. A major topographic feature is the knoll northwest of Ocotillo Heights. This knoll is comprised of mixed alluvium and eroded bedrock and varies from approximately 1,860 to 2,100 feet in elevation. Knolls, including Sand Hill and Artillery Hill, are generated by compression forces along fault zones.

Figure 3.7: Marine Corps Air Ground Combat Center Topography



3.8 Geology

The Combat Center is located within the Mojave Desert Geomorphic and Tectonic Province, often interchangeably called the Mojave Bedrock, a name that reflects the geologic and tectonic framework of the province. Mojave Bedrock consists of low mountain ranges and isolated rock outcrops separated by narrow to broad alluvial bases and lava flows. The Combat Center geological basin was formed by the West Bullion Mountain Fault and the Mesquite Lake Fault. Oldest geologic elements on the Combat Center are the Bullion Mountains, that consist of primarily quartz monzonite and granite, a gray rock with purplish varnish interspersed with large crystals of feldspar. Layers of blow sand contribute to lower elevation soils of mountains adjacent to Mainside.

The Combat Center geological make-up consists of tertiary basement rock with overlying quaternary alluvial deposits. The basement rock is nearly impermeable except where it has been fractured or weathered. It is not an important source of ground water.

Alluvial deposits, varying in age and thickness, lie within valleys between mountain ranges. Alluvial deposits that flank mountain ranges have developed into numerous, gently dipping alluvial fans. Sediment composing alluvial fans is primarily from the weathering and erosion of local mountain ranges. Older deposits, often including subsoil layers cemented with silica and engulfed with calcium carbonate, contain sand, gravel, and tightly cemented clay and silt. Newer deposits consist of layers of alluvium containing primarily sand and gravel.

The alluvial fill that overlays the crystalline bedrock contains a significant quantity of water upon saturation. Alluvial deposits are dissected in many locations by streams or washes that generally discharge into dry lakes or playas. Dry bed lakes are composed of stratified impermeable alluvium deposits.

3.8.1 Seismicity

The Combat Center is located in a highly active seismic region. The installation is in proximity to the San Andreas Fault to the southwest, the Pinto Mountain Fault to the south, and the Garlock Fault to the north. The Combat Center has approximately 50 named and unnamed faults within its boundary. The most prominent faults include Lavic Lake, Surprise Spring, West Calico, Bullion, Mesquite Lake, Emerson, Galway, Deadman, Mesquite, and Quackenbush Lake.

Mainside is located between West Bullion Mountain and Mesquite Lake faults, northwest-trending right lateral faults that are approximately 1.2 miles apart. The West Bullion Mountain Fault is part of the Bullion Fault and is certified as potentially active by the U.S. Geological Survey. The fault runs close to the new hospital and the southeastern housing area. The Mesquite Lake Fault is part of the Calico Fault and is next to the Ocotillo Heights housing area. An open fissure, the Airfield Fault, is on the southeastern bank of Mesquite Dry Lake. The fissure is believed to be caused by the creeping of West Bullion Mountain and Mesquite Lake faults that caused tensile and compressive stresses in the soil mass in directions approximately 45 degrees from the faults.

The most prominent active fault system at the Combat Center is the Calico-Mesquite Lake Fault System

that includes the West Calico, Calico, Pisgah, and Mesquite Lake faults. These faults are responsible for several small earthquakes recorded by the California Institute of Technology seismic stations. On 28 June 1992 the Landers Earthquake, primarily centered on a segment of the Camp Rock-Emerson Fault Zone 10-12 miles northwest of the Combat Center, was measured at a Richter Scale magnitude 7.5 and resulted in vertical and lateral ground surface ruptures to the north and west of the Combat Center.

On 16 October 1999 the Hector Mine Earthquake, a 7.1 magnitude event, occurred on the Lavic Lake fault with its epicenter in the north central section of the Rainbow Canyon Training Area in the northwestern sector of the Combat Center. This "inactive" fault had not produced a large earthquake within the last 10,000 years. The surface rupture was about 24 miles long and produced an apparent maximum offset of 12-15 feet[4].

3.8.2 Petroleum and Minerals

There is a rich history of mining activity both on and adjacent to the Combat Center. Abandoned mines are present at Emerson Lake, Bullion, Delta, Prospect, Maumee Mine, Sunshine Peak, Lavic Lake, and Lead Mountain. America Mine, a sometimes active gold mine, is just outside the Combat Center boundary, adjacent to the America Mine Training Area. Minerals found on the Combat Center include lead, zinc, copper, silver, and gold. The Department of the Navy has the authority to reject mining claims with the exception of "certain hardrock minerals known as locatables" (DoD Directive 4700.3). "Locatables" include gold and silver. However, since military reservations have historically not been open to any type of mining, the possibility of having to suspend or curtail MAGTFTC training exercises due to mining activities is very unlikely. In recent years, military installations have been open to mining of certain minerals, most notable oil and gas. However, the possibility of oil and gas mining, given the geology of the area, is extremely remote.

The U.S. Geological Survey and Katzenstein and Whelan (1987) investigated the geothermal potential of steam trapped underground at the Combat Center. They concluded that temperatures were not high enough to make development economically feasible.

3.9 Soils

3.9.1 General

Soils develop very slowly in the harsh conditions of desert environments and may not be replaced for centuries following disturbance (Phillips, Brant, and Reddick, Inc., 1981). Desert soils are extremely fragile and vulnerable to disruption, that results in wind and water erosion. Soils may be transported away from disturbed areas, leaving them void of soil or soil-forming materials. Desert soils are also highly vulnerable to compaction.

Hardened soil crusts form on clay or silty desert soils by the biological activity of resident bacteria, algae, and lichens. These cryptogamic crusts stabilize surface integrity and resist wind and water erosion

[4] http://www-socal.wr.usgs.gov/hector/report.html, 1/10/00.

from both water drops and flows. These crusts "fix" atmospheric nitrogen in low quantities, making it available to desert flora. The time required for these soils to develop and their recovery rates are unknown. Webb *et al.* (1986) estimated it takes a minimum of 50 years for vegetation to recover, 100 years for soil, and over 1,000 years for total recovery.

Patches of cryptogamic crusts are found at the Combat Center. These may include many different soil associations; however, they are usually characterized by a surface crust of pebbles and rocks, often rendered dark and shiny.

The coarsest depositional materials derived from mountainous parent rock are generally found on upper regions of high plains; the finest materials are along valley floors. Soils of upper bajadas (or coalescent alluvial fans along bases of mountain ranges) consist of coarse gravels grading into loamy gravels toward the toe of alluvial fans. Soils of lower bajadas grade from sandy loams to finer loamy materials. Playas located at the bottom of basins accumulate silts and clays and generally develop salt pans.

Higher mountains of the Combat Center are excessively drained, very stony or rocky, sandy loams to sands that are derived from nearby parent material. These soils develop on strongly sloping to very steep upland slopes with rock outcrops covering much of the ground surface area. Where present, soil depth is seldom more than 10 inches.

3.9.2 Soil Survey

The Natural Resources Conservation Service (Lato *et al.*, 1999) completed a report on a survey of the soils on the Combat Center. Below descriptions are taken from that report. Figure 3.9.2 (Soils) shows the location of these soils.

Playa soils are very deep, salt effected soils formed in lacustrine deposits. These soils occur on basin floors and occupy about 3% of the Combat Center.

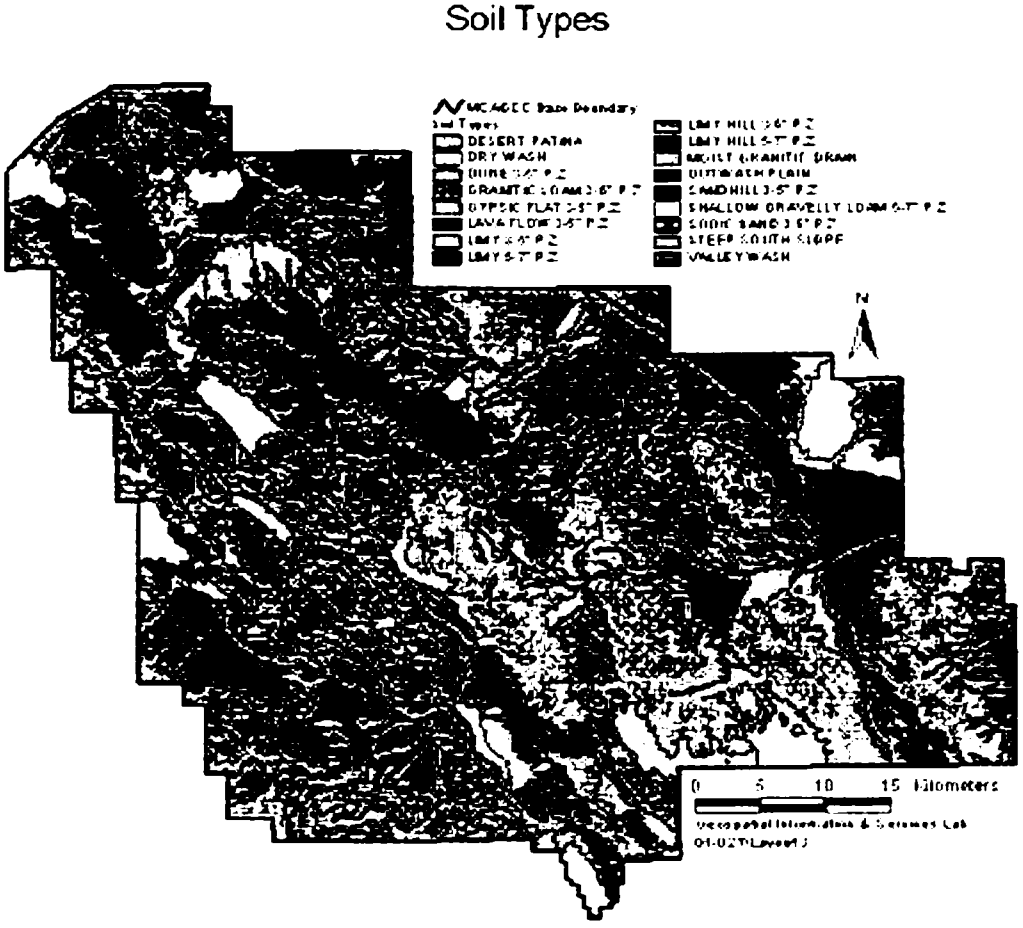
Cajon-Bluepoint soils are very deep and formed in sandy materials. They are found in the southwestern portion of the Combat Center on smooth granitic fan piedmonts and occupy about 9% of the Combat Center.

Edalph-Narea-Calico soils are very deep, sandy soils formed in granitic alluvium. They are found in the southwestern portion of the Combat Center and occupy about 9% of the total land.

Arizo soils are very deep, sandy-skeletal soils formed in mixed alluvium. They occur in the northwestern, central, and southeastern parts of the Combat Center on recent fan piedmonts and occupy about 20% of the Combat Center.

Carrizo soils are very deep, sandy-skeletal soils formed in mixed alluvium. They are found in the northeastern part of the area on recent fan piedmonts and occupy about 16% of the Combat Center.

Figure 3.9.2: Marine Corps Air Ground Combat Center Soils



Eastrange-Owlshead-Gayspass soils are very shallow to very deep soils formed in alluvium from mixed sources. These soils are found throughout the Combat Center on older fan piedmonts and occupy about 6% of the area.

Dalvord-Goldroad-Rock Outcrop soils are very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from granitic and metamorphic sources. They are found mostly in the southeastern part of the Combat Center on granitic mountains and cover about 18% of the total area.

Haleburu soils are very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from mainly volcanic sources. They occur in the northwestern part of the Combat Center on volcanic mountains and comprise about 13% of the total.

Sunrock-Haleburu-Lava Flows are very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from mainly volcanic sources. They are found in the northern areas and occupy about 6% of the Combat Center.

3.10 Water Resources

3.10.1 Surface Water

During heavy storm events, water in washes carries sand, gravel, cobbles, and even boulder-sized rocks as part of the bedload transport. Deposition of this bedload material across areas of less steep terrain has resulted in the formation of alluvial fans commonly observed in this area. Significant subsurface flows may occur in unconsolidated sand and gravel channel deposits found in washes and alluvial fans, even after surface flows have ceased. Local groundwater recharge may occur along washes because of this subsurface water movement. Without a drainage outlet, surface water in shallow ephemeral lakes is lost through groundwater percolation or evaporation.

All streams are intermittent, and all naturally occurring, standing water is ephemeral, occurring only during and immediately after heavy rains or thunderstorms. When surface flow due to high intensity rainfalls occurs, the water soon percolates into the sandy soil of dry washes and/or collects on playas. Standing water on playas, a result of low infiltration rates in evaporated clay lake beds, is a short-lived phenomenon. Evaporation of playa waters results in precipitation of alkali salts at or near the surface of the playa.

Surface drainage at the Combat Center is internal; most runoff flows inward, from all directions, into playas (Lato *et al.*, 1999). The Combat Center has 16 watersheds, ranging in size from 2,819 acres to 52,178 acres. Quackenbush Lake watershed is the only one that lies entirely within the base boundary. Combat Center watersheds contain playas, dry washes, seeps and springs, and man-made water bodies.

There are 14 playas throughout the Combat Center totaling approximately 7,674 acres. Two prominent (and the most heavily impacted) playas are Mesquite Lake (located near Mainside) and Deadman Lake (located in Sand Hill, Gypsum Ridge, and West training areas). Both lakes' source of water is seasonal precipitation and runoff from the surrounding watershed. Unlike Mesquite Lake, Deadman Lake does not have any appearance of uplifted and tufted soils, suggesting that a ground water table is near the surface.

There are 289 dry washes totaling 50,471 acres, but only 12 are major washes. The largest dry washes are located in the three largest watersheds (Deadman Lake, Bristol Lake, and Dry Lake). Approximately 25 percent of all dry washes occur in the Bristol Lake watershed (U.S. Army Corps of Engineers, 1994).

Seeps and springs are a valuable biological resource, particularly when standing or flowing water is available for wildlife. The U.S. Army Corps of Engineers (1994) found four wells and two springs recorded from U.S. Geological Survey topography maps. Seasonal seeps are located in the Imperial Lode mining area, Lead Mountain area, and several mine shafts throughout the Combat Center. The study also indicated a potential for other seeps to exist seasonally depending on precipitation and exposed bedrock in the wash. There are no naturally occurring, permanent surface water resources on the Combat Center (Lato *et al.*, 1999).

Man-made water bodies at the Combat Center include stormwater retention ponds to the northeast of Mesquite Lake, golf course ponds, sewage lagoons located near the Deadman and Mesquite lakes and the golf course (Section 3.6.4), and miscellaneous bomb craters in playas. None of these waters are regulated under Section 404 of the Clean Water Act. Manmade water bodies provide wildlife habitat. In addition, the study (U.S. Army Corps of Engineers, 1994) noted that settling basins trap sediment that would otherwise flow into Mesquite Lake.

3.10.2 Ground Water

The 16 watersheds within the Combat Center overlay two basins, Deadman Valley Basin and Twentynine Palms Valley Basin. Deadman Valley Basin contains Surprise Spring and Deadman Lake subbasins. Twentynine Palms Valley Basin contains Mesquite Lake and Dale Lake subbasins. (Dale Lake Subbasin is located entirely outside of the Combat Center's boundaries.)

The ***Surprise Spring Subbasin*** contains approximately 80 square miles of unconsolidated fill that has an estimated maximum depth of 2,000 feet. Subsurface water in the Surprise Spring Subbasins is predominately fossil water dating from the wet climate of the Pleistocene era and has minimal recharge via runoff from the San Bernardino mountains.

Ground water within Surprise Spring Subbasin, the primary source of potable water for the Combat Center (Section 3.6.3), is primarily composed of a sodium bicarbonate type and consists of a high quality that meets water quality criteria established under the Safe Drinking Water Act and associated amendments. To date, ground water samples collected do not contain detectable levels of contamination by volatile organic compounds, chlorinated and organophosphate compounds, or pesticides.

Deadman Lake Subbasin ground water is not potable. It is comprised of a sodium bicarbonate type; however, most of the ions are highly concentrated. Deadman Lake Subbasin ground water exceeds the drinking water standards because of high concentrations of fluorides, sulfates, and boron. Ground water from this subbasin can be utilized for landscaping and other non-consumptive uses. Since ground water from Deadman Lake Subbasin exceeds primary drinking water standards for fluoride, treatment would be required before this water would be suitable for blending with potable Surprise Spring Subbasin water. Measurements of water level in wells indicate a southward component of flow from the Deadman Lake area into Mesquite Lake Subbasin.

Analysis of water from an old, off-base, supply well in the ***Mesquite Lake Subbasin*** indicates that this subbasin contains water that exceeds federal standards for concentrations of sulfates, fluorides, and dissolved solids. Water quality in this basin, primarily a sodium sulfate type, is inferior to both the Surprise Spring and Deadman Lake subbasins. Ground water within Mesquite Lake Subbasin would require treatment before blending with Surprise Spring Subbasin ground water for potable use; however, Mesquite Lake Subbasin ground water can be used directly for construction activities and landscape irrigation.

3.11 Climate

The area encompassing Twentynine Palms is called the Morongo Basin and is classified as having an arid, upland desert climate. Summer months are characterized by high temperatures, low humidity, and clear, sunny days[5]. On average, the sun shines 97% of the time and 65% in winter (Lato *et al.*, 1999).

The Combat Center is located in one of the more arid parts of the Mojave Desert. The climate is characterized by hot days and cool nights with low humidity and low annual rainfall. Temperature extremes range from an average daily high of 105.4° F in July to an average daily low of 51.6° F in January. The highest and lowest recorded temperatures at Twentynine Palms were 118° and 10°, respectively (Lato *et al.*, 1999).

The average total precipitation at Twentynine Palms is about 4.16 inches. Of this, about 1.90 inches (46%) falls between November and March, and about 1.80 inches falls between July and September. No significant snowfall has been recorded (Lato *et al.*, 1999). Winter storms tend to be relatively gentle and may last up to two days. During July through September the area can be visited by violent thunderstorms, that can drop large volumes of water in short periods of time (*e.g.*, in 1976, 12.5 inches fell in one week), causing flash floods and significantly affecting soil erosion. Annual precipitation at the Exercise Support Base weather station for the last 14 years averaged 2.75 inches, and average rainfall at Joshua Tree National Park over the last 58 years averaged 4.38 inches. Within this region, differences in precipitation occur because of the rain shadow effect from the San Bernardino Mountains (U.S. Army Corps of Engineers, 1994).

The direction and strength of prevailing winds vary with the season. Typically, winter months bring mild northwesterly winds that range from five to 10 mph. During summer, winds are generally westerly to southwesterly, reaching speeds of 10 to 15 mph in the afternoons. The strongest winds occur in the fall, with gusts of up to 77 mph from the northwest.

3.12 Flora

The Mojave Desert is divided into five floristic regions (Rowlands *et al.*, 1982). The Combat Center lies in the South-Central Region where temperature and rainfall patterns approach conditions more typical of the hotter, drier Sonoran Desert to the south.

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[5] Taken from www.29palms.usmc.mil.

3.12.1 Floral Inventory

Although the vegetation at the Combat Center is predominantly Creosote Bush Scrub, Saltbrush Scrub, and Blackbush Scrub, vegetation types common in the Mojave Desert, elements more typical of the Sonoran Desert are also present. As of September 1998, there were 387 native and naturalized vascular plants recorded for the Combat Center, that included 66 families, 219 genera, 381 species, and 387 total taxa (including subspecies and varieties) (Elvin, 2000). Elvin (2000) voucher-documented 361 of these taxa.

3.12.2 Plant Communities

Predominant vegetative species at the Combat Center are desert annuals and creosote bush. The density and diversity of the vegetation increases significantly at higher elevations. Four major vegetation types (of 15 total) are found on the Combat Center (Figure 3.12.2): Mojave creosote bush scrub, desert saltbush scrub, Mojave wash scrub, and blackbush scrub (Lato *et al.*, 1999).

Mojave creosote bush scrub, dominated by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*), is the dominant vegetation type on the Combat Center. This type occurs on gently sloping alluvial fans to steep side slopes of mountains and hills.

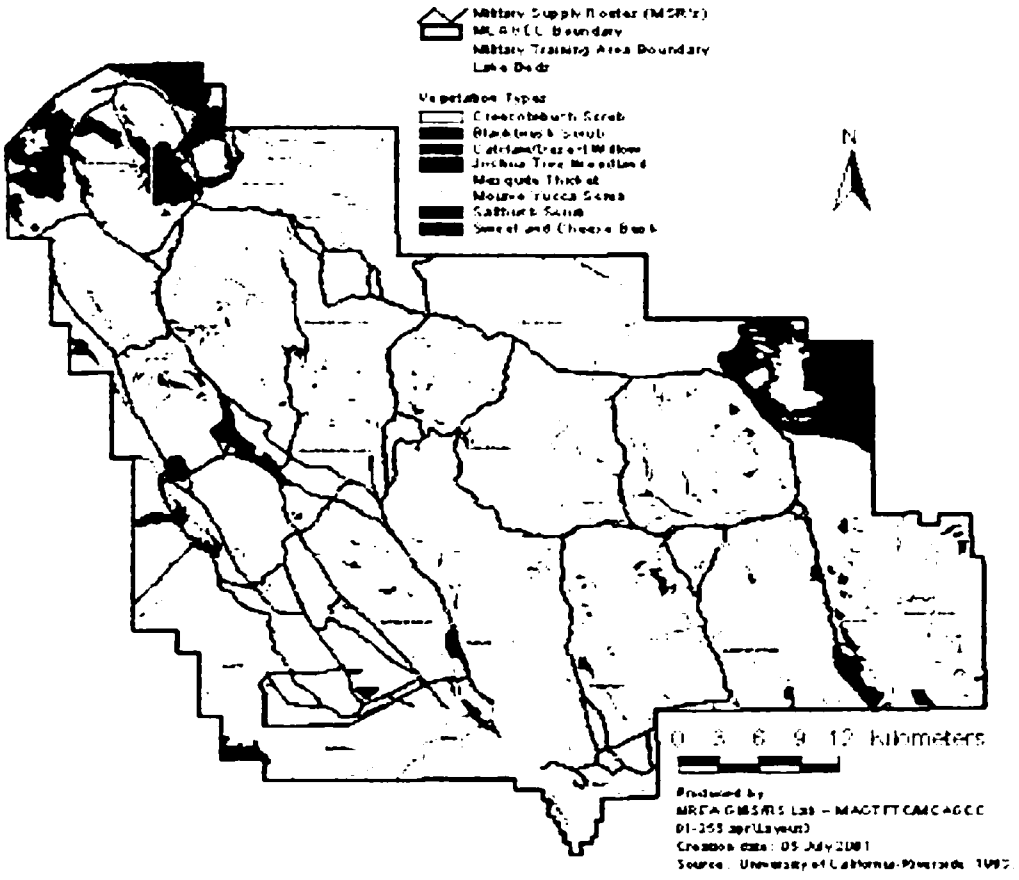
Desert saltbush scrub is characterized by one or more species of saltbush (*Atriplex* spp.) in combination with other halophytes, often prevalent around margins of dry lakes or other poorly drained soil types.

Mojave wash scrub, occurs in ephemeral channels, is influenced by the size of the watershed, slope gradient, parent material, soil texture, and climate. Smoke tree (*Psorothamnus spinosus*) occurs at lower elevations in many dry watercourses. Desert willow (*Chilopsis linearis*) occurs in large ephemeral channels where there is a permanent source of underground water.

Blackbrush scrub is dominated by blackbrush (*Coleogyne ramosissima*) accompanied by other species including turpentine broom (*Thamnosma montana*), hopsage (*Grayia spinosa*), winterfat (*Eurotia lanata*), shadscale (*Atriplex confertifolia*), and Anderson's boxthorn (*Lycium andersonii*). This vegetation type occurs on the flat top of Argos Mountain, near OP Round, and on high alluvial slopes in the Sunshine Peak Training Range.

There are variations in the classification and naming of vegetation types or plant communities on the Combat Center. For example, the above Mojave creosote bush scrub (Lato *et al.*, 1999) was called creosote bursage scrub by Krzysik and Trumbull (1996), and it was broken into various groups by the University of California, Riverside (1993). The MAGTFTC GIS database uses the 15 plant communities identified by the University of California, Riverside (1993), as follows:

Figure 3.12.2: Marine Corps Air Ground Combat Center Plant Communities



Plant Community	% MCAGCC Coverage
Blackbush Scrub	0.7
Catclaw/Desert Willow	1.5
Creosote Bush Clones	<0.05
Creosote Bush Scrub	64.0
Creosote Bush/Galleta Grass	6.0
Disturbed Creosote Bush	10.0
Dune Creosote Bush Scrub	3.0
Joshua Tree Woodlands	0.2
Lake Beds	1.5
Mesquite Thicket	<0.05
Mojave Yucca Scrub	0.3
Nevadan Creosote Bush	1.5
Saltbush Scrub	6.0
Sparse Creosote Scrub	4.0
Sweetbush/Cheesebush	2.0

A vegetation map for the Combat Center (Figure 3.12.2 - Plant Communities), now a GIS data layer, is based upon the 15 plant communities originally mapped by the University of California, Riverside (1993). This map was created using aerial photographs of the Combat Center and ground-truthed using a series of vegetation belt transects to sample plant diversity and distribution.

There are also certain areas where the natural vegetation is distinct for the region. These areas include the wettest parts of the Combat Center, where Mojave yucca (*Yucca schidigera*) "woodland" with Death Valley joint-fir (*Ephedra* spp.) exists. One of the most significant characteristic plants of this region is the Joshua tree (*Yucca brevifolia*), a distinctive tree-like yucca.

Landscaped areas of the Combat Center are restricted to Mainside. Vegetation consists of a variety of ornamental trees, shrubs, and ground-cover. Most vegetation at Mainside is commonly used in the region. For the most part, Mainside vegetation is relatively drought tolerant.

3.12.3 Ecosystems

Krzysik and Trumbull (1996) described 14 Combat Center ecosystems with species-ecosystem associations and management options for each ecosystem. Below is a brief summary of ecosystems described.

Creosote/Bursage Scrub Series - Creosote bush and white bursage are dominant species in the Creosote/Bursage Series. This series is classified into five ecosystems:

- ***Creosote/Bursage Scrub: Valleys, Gentle Bajadas*** - This ecosystem includes 50% of the Combat Center, in valleys, rolling plains, flats, and gentle bajadas and alluvial fans. In undisturbed valleys creosotebush forms elliptical mosaics of clones, with each clone consisting of genetically identical individuals whose ancestors germinated thousands of years ago... some of the oldest genotypes on earth. A total of 142 vertebrate wildlife species (54 birds, 38 reptiles, and

50 mammals) are possible for this type at the Combat Center.

- ***Creosote/Bursage Scrub: Disturbed*** - This ecosystem was originally the Valleys, Gentle Bajadas Ecosystem, but it has been subjected to extensive military training activities with moderate to high disturbance. This disturbed ecosystem covers 10% of the Combat Center. A total of 68 vertebrates may be found in this ecosystem.
- ***Creosote/Bursage Scrub: Mountains*** - This ecosystem typically possess moderate to high diversity of woody perennials. Creosotebush is predominately found as small individuals, never clones. This ecosystem is found on steep slopes, alluvial fans, or bajadas; boulder fields, talus slopes, or rocky outcrops; steep broken ridges or hills; and canyons or arroyos. This ecosystem includes 24% of the Combat Center, mostly in the Bullion Mountains and is used by 149 vertebrates.
- ***Creosote/Bursage Scrub: Sand Dunes*** - The Sand Dune Ecosystem is dominated by creosotebush, bursage, galeta and Indian rice grasses, and sand dune annuals. It is found on 3% of the Combat Center, predominately in the southwestern and northern portions. It supports 63 vertebrates.
- ***Creosote/Bursage Scrub: Lava Flows*** - Lava flows, existing as solid basalt pavements, boulders, and rocky and coarse-gravel substrates, are the primary characteristic of this ecosystem. The Lava Flow Ecosystem is found on 5.4% of the Combat Center, on the northern boundaries and is used by 71 vertebrates.

Other Vegetation Series Ecosystems

- ***Yucca Woodlands: Joshua Trees and/or Mojave Yucca*** - This Joshua tree-dominated ecosystem is confined to the southwestern and northwestern corners of the Combat Center, covering only 0.4% of total land. This biodiversity-rich ecosystem supports 184 vertebrates.
- ***Saltbush Scrub: Playa and Uplands*** - About 6% of the Combat Center (alkaline margins of dry lake beds) includes this saltbush ecosystem. This habitat supports 50 vertebrate species.
- ***Blackbrush Scrub*** - Blackbrush ecosystems are widespread on upper bajadas and rocky alluvial mountain slopes in the Mojave Desert, but they only comprise 0.7% of the Combat Center, primarily in the northwestern corner of the installation. A total of 154 vertebrates may be found in this ecosystem.

Riparian, Wet Areas, and Aquatic Ecosystems

There are five important reasons for the exceptional ecological significance and landscape value of riparian, wet areas, and aquatic ecosystems in the Mojave Desert:

51. They include habitats of exceptional biological diversity and ecological processes.
52. They are landscape corridors for population dispersal, gene flow, and recolonization routes for local extinctions.
53. They are critical feeding and resting sites for migratory birds and bats.
54. Springs/seeps or canyon hydroriparian ecosystems are habitat islands for rare, relict, or endemic habitat specialist species.
55. Due to severe impacts by humans and their animals, remaining native examples of these ecosystem possessing ecological integrity are becoming more significant for local and regional biodiversity.

- ***Desert Riparian (Xeroriparian)*** - These tree-dominated, desert wash ecosystems associated with narrow-strip, ephemeral surface waters include less than 0.5% of the Combat Center. This biodiversity rich ecosystem has a possible 178 vertebrate species.
- ***Desert Wash with Ephemeral Flows*** - This smaller wash ecosystem can be consider a smaller scale xeroriparian ecosystem, similar to the Desert Riparian Ecosystem, but dominated by shrubs instead of trees. It is found on 2-4% of the Combat Center and supports 146 species of vertebrates.
- ***Springs and Seeps*** - This ecosystem is poorly represented at the Combat Center. No permanent springs are known; at least one intermittent spring with hydrophytic vegetation is known (Sunshine Peak) as is one ephemeral spring with no hydrophytic vegetation (north of Lead Mountain). A total of 221 vertebrates are possible for this ecosystem.
- ***Dry Lake Beds (Playas)*** - Fourteen playas, 1.9% of the Combat Center, comprise this ecosystem. Surface water in playas is ephemeral and highly episodic. Fifty species of birds may use playas.
- ***Wet Areas/Ponds/Riparian: Perennial*** - This man-made habitat type covers less than 0.1% of the base within and near Mainside. The area is heavily used by migratory birds, and it is critical to a number of resident and breeding birds and other animals. This ecosystem is used by 88% of the potential avian fauna of the southern Mojave Desert.

Caves, Mines, and Rock Crevices - These subterranean habitats are critical for bats, and they are used by other wildlife species for water, shelter, and protection from the heat.

The important feature to note with regard to ecosystems and biological diversity is that about 90% of the Combat Center is in the Creosote/Bursage Scrub Ecosystem. Yucca Woodlands, Desert Riparian, and Wet Areas/Ponds/Riparian: Perennial ecosystems, by far the richest in terms of wildlife biodiversity, include less than 1% of training land.

3.12.4 Ecological Sites

An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. An ecological site is the product of all environmental factors responsible for its development, including parent material, landscape, climate, soils, biota, hydrology, fire, and time in place. Lato *et al.* (1999) divided the Combat Center landscapes into ecological sites for purposes of inventory, evaluation, and management.

The following criteria were used (Lato *et al.*, 1999) to differentiate one ecological site from another:

- significant differences in species or species groups in characteristic plant communities;
- significant differences in the relative proportion of species or species groups in characteristic plant communities;
- significant differences in total annual production of characteristic plant communities; and
- soil factors that determine plant production and compositions, site hydrology, and functioning of ecological processes of the water cycle, mineral cycles, and energy flow.

The following ecological sites were identified on MCAGCC:

Alluvial Plain	Lava Flow 3-5" P.Z.	Saline Hill 3-5" P.Z.
Cobbly Wash	Limy 3-5" P.Z.	Sandhill 3-5" P.Z.
Desert Patina	Limy 5-7" P.Z.	Sandy Plain 3-5"
Dry Wash	Limy Hill 3-5" P.Z.	Shallow Gravelly Loam 5-7" P.Z.
Dune 3-5" P.Z.	Limy Hill 5-7" P.Z.	Sodic Dune 3-5" P.Z.
Granitic Drain 5-7" P.Z.	Loamy Hill 5-7"	Sodic Sand 3-5" P.Z.
Granitic Loam 3-5" P.Z.	Moist Granitic Drain	Steep South Slope
Gravelly Ridge 5-7", P.Z.	Outwash Plain	Valley Wash
Gypsic Flat 3-5" P.Z.	Saline Flat 3-5" P.Z.	

(Note: P.Z. = Precipitation Zone.)

3.12.5 Special Status Flora

Special status flora include those species federal- or State-listed as endangered or threatened; proposed or a candidate for such listing; included on List 1, 2, 3, or 4 in the California Native Plant Society's Inventory (Skinner and Pavlik, 1994); meets criteria to be included in these lists; or meets criteria to be considered under the California Endangered Species Act. Congress has not waived sovereign immunity under the Endangered Species Act; therefore, MAGTFTC is not legally required to comply with California endangered species laws. However, it is the Marine Corps policy to consider State-listed species in the NEPA process.

Results of one of MAGTFTC's first efforts to do a comprehensive survey for special status plants was incorporated into the *Natural Resources Management Plan, MCAGCC Twentynine Palms, California* (University of California, Riverside, 1993). The survey did not find any federally-threatened or endangered plant species. An ongoing study (Elvin, 2000) reports 11 sensitive plant taxa (of which 10 are documented with California Natural Diversity Database forms) on the Combat Center.

There are no known federal- or State-listed endangered or threatened species of plants within the Combat Center. Sensitive plants known to occur on the Combat Center (Elvin, 2000) are as follows:

Scientific Name	Common Name	Federal Status*	State Status*	CNPS Status*
Allium parishii	Parish's onion	None	None	4
Castela emoryi	crucifixion thorn	None	None	2
Cryptantha holoptera	rough-stemmed forget-me-not	None	None	
Cynanchum utahense	Utah cynanchum	None	None	4

Scientific Name	Common Name	Federal Status*	State Status*	CNPS Status*
Escobaria vivipara var. *alversonii* [= *Coryphantha v.* var. *a.*]	foxtail cactus	R	None	1B
Ferocactus cylindraceus var. *cylindraceus* [= *F. acanthodes* var. *a.*]	California barrel cactus	R	None	4
Galium angustifolium ssp. *gracillimum*	narrow-leaved bedstraw	None	None	
Linanthus arenicola	sand linanthus	R	None	2
Muilla coronata	crowned muilla	R	None	4
Penstemon albomarginatus	white-margined beardtongue	None	None	1B
Wislizenia refracta ssp. *refracta*	jackass clover	None	None	4

Rare plants potentially present and with a moderate-high potential to find on the Combat Center (University of California, Riverside, 1993; Elvin, 2000) are as follows:

Scientific Name	Common Name	Federal Status*	State Status*	CNPS Status*
Camissonia boothii spp. *boothii*	Booth's evening primrose	None	None	
Chorizanthe spinosa	Mojave spineflower	None	None	
Chorizanthe xanti var. *leucotheca*		None	None	
Cryptantha costata	ribbed cryptantha	None	None	
Dudleya saxosa ssp. *saxosa*	panamint dudleya	None	None	
Eriophyllum mohavense	Barstow woolly sunflower	R	None	1B
Gilia aliquanta spp. *aliquanta*	aliquant gilia	None	None	3
Lasthenia glabrata var. *coulteri*	coulter goldfields	None	None	1B
Matelea parvifolia	spearleaf	None	None	2
Monardella robisonii	Robison's monardella	R	None	1B
Penstemon thurberi	Thurber's beardtongue	None	None	
Physalis lobata	lobed ground-cherry	None	None	2
Portulaca halimoides (*P. mundula*)	desert portulaca	None	None	2
Sclerocactus polyancistrus	Mojave fish-hook cactus	None	None	

Scientific Name	Common Name	Federal Status*	State Status*	CNPS Status*
Sidalcea neomexicana	Salt Spring checkerbloom	None	None	2

*Definitions:

Federal

R Taxon removed from Candidate status (no present compliance status).

State

CR State-listed as Rare.

CC Candidate for State listing.

California Native Plant Society. Per the CNPS publication, *Inventory of Rare and Endangered Vascular Plants of California*:

1B Rare or endangered in California and elsewhere.

2 Rare or endangered in California, but more common elsewhere.

3 Need more information (a review list).

4 Plants of limited distribution (a watch list).

Elvin (2000) also lists 13 potential Combat Center plants in the low-moderate potential to find category.

3.13 Fauna

Wildlife species at the Combat Center are typical of Mojave Desert fauna with the exception of a wide variety of non desert-adapted species inhabiting Mainside, particularly manmade water areas (Cutler *et al.*, 1999). Most wildlife species on the installation (except Mainside) are adapted to desert scrub habitats that provide little cover and xeric conditions.

Seeps and springs and manmade bodies of water provide perennial sources of water and a high concentration of vegetation and cover that contribute to increased wildlife diversity in these areas. Large mammals, such as the bighorn sheep, coyote, and bobcat, use these water sources and return to them regularly; bats typically forage over these areas because of increased abundance of invertebrate prey. Bird species that migrate in the spring and fall (and are not usually associated with the desert environment) forage and rest in these areas, particularly at manmade bodies of water.

Rocky terrain provides habitat for many reptile, rodent, and bird species. Along with different vegetation communities that normally occur with increasing elevation in these ranges, differences in slope and aspect result in microhabitats that support different wildlife species. Notable species that occur in these areas include bats, that rely on rocky outcrops for roosting sites, and raptors, that use cliff faces and rocky ledges for roosting or nesting.

Playas provide little wildlife habitat because they are basically devoid of vegetation. They do contain, however, endemic microbiological communities of algae that support brine shrimp. Migratory waterfowl and large mammals may visit these areas after periods of heavy rainfall.

As is typical of most desert systems, larger animal species are uncommon, widely dispersed, and often nocturnal. Smaller mammals and reptiles, highly adapted to harsh desert conditions, are much more common but are often either secretive, nocturnal, or active for only short periods of the year. Birds are among the most conspicuous species, usually occurring in greatest concentration in the vicinity of washes and springs where more structured and complex vegetative assemblages occur. With some exceptions,

wildlife species (such as birds and larger mammals) are generally more mobile and not limited to a single habitat type. Therefore, large portions of the Combat Center are likely used in the course of an organism's daily and seasonal activity patterns, particularly for larger or more mobile species. Some species (*e.g.*, fish, amphibians, and some reptiles and mammals) are highly adapted for one habitat type and restricted to these specialized areas.

The Natural Resources Management Plan (University of California, Riverside, 1993) included the first comprehensive inventory of vertebrate wildlife permanently or seasonally present at the Combat Center. This list included permanent residents, winter residents, summer residents, and species that appear during migrations. The inventory noted that there are approximately 100 different bird species that do not occur regularly. More recently, Cutler et al. (1999) observed 256 species of vertebrates on the Combat Center. Of these, 50% were observed only at the golf course or sewage ponds at Mainside. Appendix 3.13 lists vertebrate species known or suspected at the Combat Center.

3.13.1 Mammals

According to the University of California, Riverside (1993), Brown and Berry (1998), and Cutler *et al.* (1999), there are 34 mammal species confirmed on MCAGCC. There are also an additional 16 mammals that may be found on the Combat Center. Cutler *et al.* (1999) found small mammal species richness to be greater at high elevation sites than all other types of sites except xeroriparian washes.

In November 1992, 20 bighorn sheep (*Ovis canadensis*) (five rams and 15 ewes) were introduced onto the Combat Center near the Bullion and Cleghorn Pass training area boundary north of Cleghorn Lakes (University of California, Riverside, 1993).

Appendix 3.13 lists mammals known or suspected to occur on the Combat Center. Comments on distribution are from Cutler *et al.* (1999).

3.13.2 Birds

According to the MCAGCC Natural Resources Management Plan (University of California, Riverside, 1993) and the MCAGCC Bird Inventory (Fromer and Edwards, 1982) there are 135-140 species of birds present on the Combat Center (refer to Appendix A, Annotated List of Vertebrate Animals in the MCAGCC Natural Resources Management Plan and the List of Birds Observed on the Combat Center in the MCAGCC Bird Inventory (Fromer and Edwards,1982). In addition, the San Bernardino County Museum conducted a Neotropical Bird Survey for the Combat Center at Mainside and Wood Canyon, Gypsum Ridge Training Area. Approximately 170 species of birds were recorded (refer to Appendix C of this Plan).

Cutler *et al.* (1999) recorded 87 resident bird species on the Combat Center and another 122 migrants, vagrants, or other transient species of birds. These authors suspect, but did not prove, a greater bird species richness in washes and canyons than at other sites. Bird species richness and overall abundance were greater in 1998 following higher winter/spring precipitation (1997/98) than in 1997.

3.13.3 Fish

There currently are no active perennial springs located on the Combat Center. No documentation exists of native fish species occurring at any location on the Combat Center. The introduced mosquitofish (*Gambusia affinis*) occurs in some ponds, however, no other native, introduced, or non-native fish species are known to occur on the installation.

3.13.4 Reptiles and Amphibians

According to the University of California, Riverside (1993) and/or Cutler *et al.* (1999), there are 27 reptiles and two amphibians known on the Combat Center. In addition, there are three amphibians and nine reptiles that may be found on the Combat Center. Cutler *et al.* (1999) found that rocky areas may have lower species richness and abundance than washes, canyons, and sandy flats, particularly during years following low winter/spring precipitation. Appendix 3.13 lists reptiles and amphibians known or suspected to occur at the Combat Center. Comments on distribution are from Cutler *et al.* (1999).

3.13.5 Other Faunal Species

Although wildlife surveys typically do not focus on invertebrate species, invertebrates are an essential component of desert ecosystems, providing food for numerous vertebrate species and acting as pollinators for a large number of plant species. The seasonal reproductive cycle of some insect species results in an "explosion" of the population in a relatively short period of time. These insect swarms provide an important prey base for insectivores, such as smaller birds, reptiles, amphibians, and bats.

The Combat Center has begun to inventory its invertebrate species, generally incidental to other studies. Cutler *et al.* (1999) lists (Appendix E in report) invertebrates from classes Arachnida, Insecta, and Branchipoda collected as part of that study. Seasonal water in playa lakes allows for crustaceous species, fairy shrimp (*Anostraca* spp. and *Branchinecta lindahli*), and tadpole shrimp (*Triops longicaudatus*) to become active, particularly at Deadman Lake (Krzysik and Trumbull, 1996).

3.13.6 Special Status Fauna

Cutler *et al.* (1999) list 16 resident and 19 nonresident species observed at the Combat Center that are considered to have special status. Two changes in federal listing have occurred since this report. The peregrine falcon (*Falco peregrinus*) has been delisted, and federal special concern species are no longer listed. However, these species continue to be California-listed, so the number of known special status species remains valid. It is important to note that the list contains three nonresident species (willow flycatcher, Bell's vireo, and snowy plover) for which the subspecies observed on the Combat Center were not known; thus, the presence of federal-listed endangered or threatened species is uncertain since these are subspecific designations. The desert tortoise, both federal- and State-listed as Threatened, is the only federal-listed resident faunal species known on the Combat Center.

The below table lists observations by Cutler *et al.* (1999), Brown and Berry (1998), and other sources that are special status faunal species known on the Combat Center:

Scientific Name	Common Name	Federal Status*	State Status*
Resident Species			
Accipiter cooperii	Cooper's hawk	None	CSC
Accipiter striatus	sharp-shinned hawk	None	CSC
Antrozous pallidus	pallid bat	None	CSC
Aquila chrysaetos	golden eagle	BGEPA	FP
Asio otus	long-eared owl	None	CSC
Athene cunicularia hypugea	burrowing owl (western subspecies)	None	CSC
Chaetodipus fallax pallidus	San Diego pocket mouse	None	CSC
Circus cyaneus	northern harrier	None	CSC
Eumops perotis californicus	greater western mastiff bat	None	CSC
Falco mexicanus	prairie falcon	None	CSC
Gopherus agassizii	desert tortoise	FT	ST
Lanius ludovicianus	loggerhead shrike	None	CSC
Macrotus californicus	California leafnose bat	None	CSC - ***hypothetical***
Plecotus townsendii	Pacific western (Townsend's) big-eared bat	None	CSC
Toxostoma lecontei	LeConte's thrasher	None	CSC
Uma scoparia	Mojave fringe-toed lizard	None	CSC
Nonresident Species			
Asio flammeus	short-eared owl	None	CSC
Buteo regalis	ferruginous hawk	None	CSC
Chaetura vauxi	Vaux's swift	None	CSC
Charadrius alexandrinus	snowy plover	FT (western subspecies only)#	CSC

Scientific Name	Common Name	Federal Status*	State Status*
Chlidonias niger	black tern	None	CSC
Colaptes chrysoides	gilded flicker	None	SE
Dendroica petechia	yellow warbler	None	CSC
Empidonax traillii	willow flycatcher	FE (southwestern subspecies only)#	SE
Falco columbarius	merlin	None	CSC
Falco peregrinus	peregrine falcon	None	SE
Larus californicus	California gull	None	CSC
Myiarchus tyrannulus	brown-crested flycatcher	None	CSC
Numenius americanus	long-billed curlew	None	CSC
Pandion haliaetus	osprey	None	CSC
Pelecanus occidentalis	American white pelican	None	CSC
Phalacrocorax auritus	double-crested cormorant	None	CSC
Plegadis chihi	white-faced ibis	None	CSC
Riparia riparia	Bank swallow	None	ST
Vireo bellii	Bell's vireo	FE (least Bell's vireo subspecies only)#	SE (Arizona Bell's vireo or least Bell's vireo subspecies only)#

Could not determine subspecies on MCAGCC

*Definitions:

Federal. Federal categories per the Endangered Species Act, administered by the USFWS

FE Endangered - any species officially listed by the USFWS that is in danger of extinction throughout all or a significant portion of its range

FT Threatened -any species officially listed by the USFWS that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

BGEPA Bald and Golden Eagle Protection Act of 1940

State. State categories per the 1984 California Endangered Species Act[6]

SE Endangered -any species officially listed by the California Fish and Game Commission that is in danger of extinction throughout all or a significant portion of its range.

ST Threatened -any species officially listed by the California Fish and Game Commission that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

CSC California Special Concern species.

FP Fully protected in accordance with Section 3511 of the California Fish and Game Code

[6] Taken from California Department of Fish and Game, *Special Animals*, 1998.

Birds represent the largest number of sensitive species at the Combat Center. Twenty-eight sensitive species have been observed, primarily near Mainside due to the wet areas created by the golf course, sewage treatment systems, and the evaporation ponds. Sensitive birds have also been observed throughout the Training Areas.

Other special status faunal species are proposed for listing, candidates for listing, or designated as sensitive by the BLM. This list is steadily growing for the Mojave Desert region. The West Mojave Coordinated Management Plan is regularly updated with this information, and the Mojave Desert Ecosystem Program is also a source of information on these species.

Below is a brief desert tortoise species summary, as related to the Combat Center.

Desert Tortoise (*Gopherus agassizii*)

Legal Status. Federal Threatened - April 1990
State Threatened - June 1989

The desert tortoise is a large, herbivorous reptile found throughout much of the Mojave and Sonoran deserts; its range roughly approximates the distribution of creosotebush scrub. The desert tortoise spends much of the year underground to avoid extreme temperatures during summer and winter. It constructs and maintains single-opening burrows, of which there may be several within an individual's home range. The desert tortoise is active in the spring, summer, and autumn when daytime temperatures are below 90°F. Most activity occurs during spring and early summer.

The USFWS determined that the Mojave population of the desert tortoise warranted listing in response to documented population declines over large portions of its range. The decline is thought to be due to a number of reasons, including upper respiratory tract disease exacerbated by the stress of several drought seasons, loss of habitat, predation by ravens, livestock grazing, and direct disturbance by humans. The USFWS emergency-listed the desert tortoise on August 4, 1989 and officially listed the Mojave population as federally threatened in April 1990 (USFWS, 1990).

The Combat Center is within the southern Mojave subdivision of the Western Recovery Unit for the desert tortoise. The Combat Center shares its northwestern border with the Ord-Rodman Desert Wildlife Management Area. The Joshua Tree Desert Wildlife Management Area is about six miles south of the Combat Center (USFWS, 1994). Critical habitat does not occur on the Combat Center, but it shares a 6.2-mile boundary with the Ord-Rodman critical habitat, and Pinto Mountain critical habitat is six miles southeast of the Combat Center (Snover and Kellogg, 1999).

The desert tortoise on the Combat Center is well studied. Numerous surveys have been conducted over the years to document the distribution and relative densities of tortoise populations throughout the installation. *The Desert Tortoise at the Marine Corps Air Ground Combat Center, Twentynine Palms, California* (U.S. Marine Corps, 1998) lists 13 studies aboard the Combat Center and briefly summarizes the tortoise taxonomy, behavior, and life cycle.

Gardner and Brodie (2000) studied the distribution of desert tortoises on the Combat Center in higher elevations and on steeper slopes (sub-optimal habitat). This ground-breaking study showed tortoises to

occupy these habitats in greater numbers than previously documented.

Jones & Stokes Associates, Inc. (1998) surveyed for the tortoise in 18 training areas at the Combat Center. They found densities greater than 50 tortoises/mile² on 5,779 acres, densities of 21-50 tortoises/mile² on 40,985 acres, densities of 6-20 tortoises/mile² on 103,078 acres, and 0-5 tortoises/mile² on 283,530 acres. No sign of tortoises were found in the northeastern portion of the Combat Center.

Highest densities (> 50/mile²) of desert tortoises on the Combat Center are found between 2,300 and 2,950 feet above mean sea level. Second highest densities (21-50/mile²) are found between 1,970 and 3,610 feet above mean sea level. No particular correlations were detected between tortoise densities and vegetation community, geomorphology, and type of dominant substrate (Jones & Stokes, Inc., 1998).

Jones & Stokes, Inc. (1998) had the following conclusions:

- desert tortoise numbers may have declined in some more heavily disturbed areas of the Combat Center;
- the Sand Hill 2 and Emerson Lake study plots tortoise populations are at risk and may suffer declines in the future;
- vehicles were the likely cause of death of 16.2% of tortoises found dead; 14.6% of dead tortoises were likely predator-kills, mostly ravens; and other causes could not be determined;
- neither upper respiratory tract disease nor cutaneous dyskeratosis appear to be significantly affecting the Combat Center population at this time, however, recent necropsy results (Homer and Berry 2001) have indicated both of these diseases are present;
- dogs are having a deleterious effect on desert tortoise populations in West, Sand Hill, and Emerson Lake training areas; and
- human activities (generally training related) may have an adverse effect on habitat and desert tortoise populations.

In the effort to protect the installation water supply, archeological resources, and the desert tortoise, a Special Use Area of approximately 7,300 acres was established in 1991 in the Sand Hill Training Area. Tortoise densities in this area are predominantly 21-50 animals per square mile. The Special Use Area is temporarily off-limits to some types of military operations, and off-road travel is not authorized.

3.14 Land Uses

3.14.1 Mainside

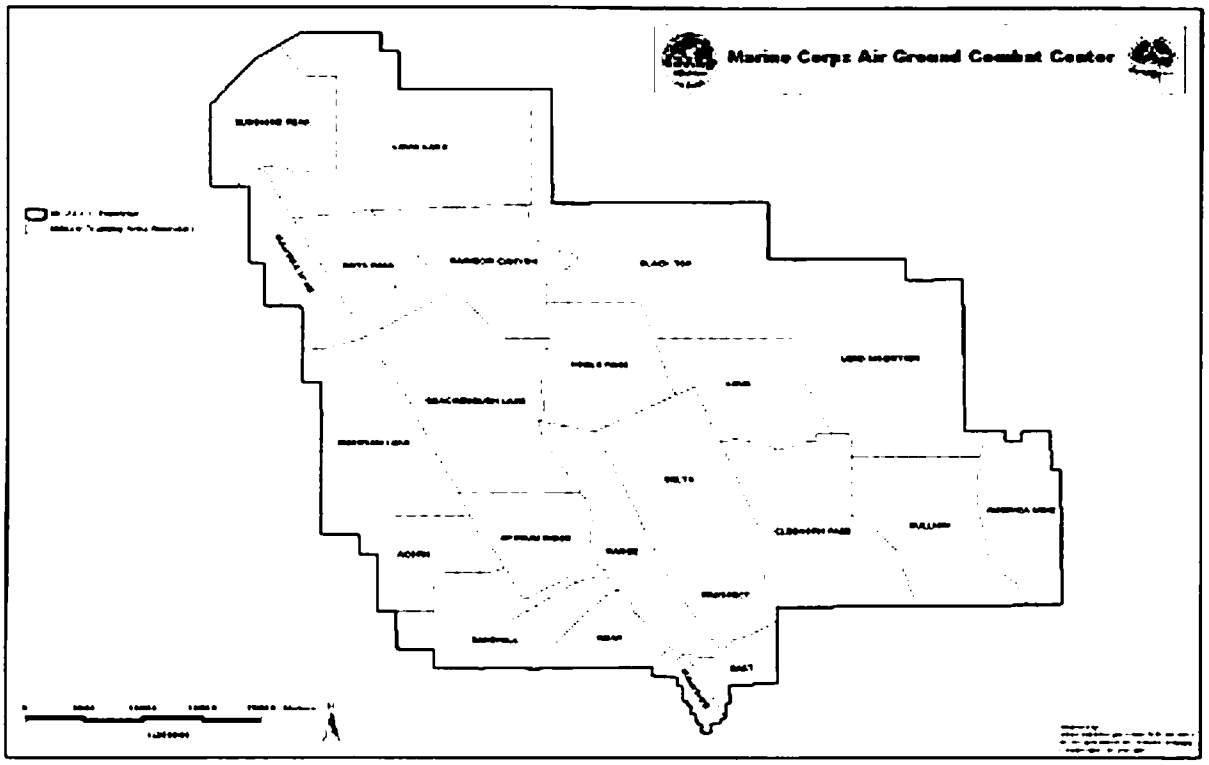
Mainside (3,942 acres) is located in the most southern part of the Combat Center. Mainside is the developed portion of the base that houses administrative, maintenance, housing, and community support facilities. Mainside is briefly described in Section 3.6.1.

3.14.2 Training Areas

In 1998 the Combat Center realigned its training areas to alleviate training scheduling problems. The Combat Center is divided into 22 training areas plus Mainside. Training area boundaries are defined by

natural topographic features. These areas are used by artillery, tanks, mechanized vehicles, fixed-wing and

Figure 3.14.2: Marine Air Ground Task Force Training Command Training Areas



rotary aircraft, and other support units. Each training area varies in size, use, terrain type and training restrictions (see Figure 3.14.2, Training Areas). Below descriptions are taken from Snover and Kellogg (1999) with acreages from the NREA GIS database.

Acorn Training Area (17,463 acres) is adjacent to the northern and western boundary of the Sandhill Special Use Area. This area is currently used as a non-live-fire maneuver area.

America Mine Training Area (20,910 acres) is located on the eastern boundary of the Combat Center. America Mine is primarily used for patrolling, mortar firing, infantry training, and Light Armored Vehicle training, being limited to these uses mainly due to lack of direct ground access. Its physical character is a combination of mountainous (37%) and rolling terrain.

Black Top Training Area (50,848 acres) is located on the northern boundary of the Combat Center. It is a live-fire and/or maneuver area. Most of Black Top is gently sloping (13% mountainous or rough). Black Top is mainly used for tank gunnery, artillery, and small arms training and major exercises.

Bullion Training Area (28,860 acres) is non-accessible from the south due to the Cleghorn Lakes Wilderness Area and the Bullion Mountain Range to the southwest. About 44% of the area is mountainous. It is used for aviation bombing and strafing, gunnery practice, artillery firing, and infantry maneuvers. Fixed Ranges 603, 605, and 607 are located here.

Cleghorn Pass Training Area (36,301 acres) consists of mountains surrounding a valley (40% mountainous or rough terrain). It contains several fixed ranges including Range 400, Range 410, Range 410A, and Range 500. Access is from the north or south. Cleghorn Pass is used primarily for small arms, tank gunnery, Light Armored Vehicle live-fire, and maneuvers. Off-road vehicle transit is not permitted, and the only area authorized for bivouacking is west of grid 99 and south of grid 97. The Armor Multi-Purpose Range Complex (MPRC or Range 500) is in Cleghorn Pass. The MPRC conducts live-fire tank gunnery qualifications up to Table VIII. In addition to the M1A1 Main Battle Tank, Light Armored Vehicles also conduct live fire training at Range 500.

Delta Training Area (29,748 acres) is used for live fire maneuver and major exercises. OP Crampton and Prospect Hill (also known as VIP Hill) are located here. The training area is 48% gently sloping land and 52% mountainous. It is essentially a narrow valley with the Bullion Mountains defining both sides of the corridor.

East Training Area (6,890 acres) is mainly gently sloping land (12% mountainous or rough) and is currently used for non-live fire activities, live-fire activities that impact in Prospect and Delta Training Areas, and staging for major exercises. This area is limited to these uses due to its proximity to Mainside. Range 100 is located in East Training Area.

Emerson Lake Training Area (32,141 acres) is located on the western boundary of the Combat Center with 70 percent of the land being gently sloping and the remaining comprised of low rolling terrain (13% mountainous or rough). This area is mainly used for tank maneuvers, aviation bombardment, and aerial targetry. The southern portion of this formerly larger training area was split off and joined with part of Sand Hill to create Acorn Training Area.

Gays Pass Training Area (18,307 acres) is used for ground-based, live-fire exercises and artillery. Its physical characteristic is denoted with the pass as gently sloping land with mountains (44%) straddling each side.

Gypsum Ridge Training Area (17,546 acres) is mostly low rolling terrain and contains the northern part of Deadman Lake. The essentially non-live fire training area is used for bivouac and wheeled vehicle maneuvers and on special occasions, live fire demonstrations are allowed in this area.

Lava Training Area (22,775 acres) is accessible from the south through Cleghorn Pass and through Delta corridor. The area, as its name indicates, has exposed lava rock with 26% mountainous or rough terrain. Lava Training Area is used primarily for battalion tactical training (including both ground-based and combined ground/air live-fire) and artillery.

Lavic Lake Training Area (54,761 acres, the largest training area) is the primary training area for aviation training exercises and is also used for live-fire maneuvers with major exercises. Most of the area is gently sloping and is made up of lava rock (17% mountainous or rough).

Lead Mountain Training Area (53,548 acres) is located on the far northeastern boundary of the Combat Center. Lead Mountain is composed of mostly gently sloping land (only 8% rough) and Dry Lake. Its training exercises consist of aviation, artillery, and ground-based live-fire. A dummy airfield is located in the southern portion of the training area.

Maumee Mine Training Area (16,103 acres) is located on the western boundary of the Combat Center. It is 19% mountainous or rough and is mainly used for artillery and maneuver training exercises.

Mesa Training Area no longer exists, having been divided into Lavic Lake, Rainbow Canyon, Gays Pass, and Quackenbush Lake training areas. However, it is included here as many documents prior to 1998 refer to this training area.

Noble Pass Training Area (24,029 acres), in the center of the Combat Center, is composed mostly of mountains. This area is commonly used for aviation and/or ground-based live-fire, tank maneuvers, infantry training, and CAXs with some artillery use. Due to the mountainous terrain (59%), there is limited vehicle cross-country mobility.

Prospect Training Area (13,146 acres) was the southern one-third of Delta before the 1998 realignment. Prospect is 22% mountainous or rough terrain and is used primarily for battalion- and company-level training as well as CAXs.

Quackenbush Lake Training Area (42,415 acres) has low, slightly rolling terrain (13% mountainous or rough terrain). Ground-based live-fire, artillery, aviation, and maneuvers are the most common training exercises for this area.

Rainbow Canyon Training Area (25,567 acres) is used as a live-fire maneuver area. It is 63% mountainous terrain and 37% maneuver area. The Bullion Mountains run through the southern portion of the area. It is used for maneuvers and artillery. Located within the Rainbow Canyon Training Area is

Range 601 (Sensitive Fuse Impact Area), an abandoned air to ground range. Range 601 is a no-maneuver area in which neither personnel nor vehicles are authorized at this time.

Range Training Area (21,739 acres) is located in the central part of the Combat Center, directly north of Mainside. The training area is mostly gently sloping and rolling terrain with 19% being mountainous or rough terrain. This area is used for training using fixed ranges and Sensitive Fuse Areas.

Sand Hill Training Area (16,786 acres) is off-limits to live-fire due to it's the proximity to Mainside and surrounding communities. It is used for maneuvers, and the Exercise Support Base and Expeditionary Air Field are partially located here along with the Assault Landing Zone Sand Hill and the Sand Hill Special Use Area.

Sunshine Peak Training Area (22,892 acres) is 38% mountainous. This training area is one of the least used due to its location in the upper northwestern boundary of the Combat Center. It's primary use is as an emergency ordnance drop zone.

West Training Area (10,621 acres) is generally gently sloping and contains Drop Zone Sand Hill, portions of the Expeditionary Air Field and Exercise Support Base, and the Assault Landing Zone. West is used for non-live fire maneuvers and major exercise staging.

3.14.3 Neighboring Land Use

Most neighboring land use is administered by the BLM, including:

- the Ord-Rodman BLM Critical Habitat Area (desert tortoise) bordering Sunshine Peak Training Area on the northwestern border,
- the Johnson Valley Off-road Vehicle Area on the western border,
- Cleghorn Lakes BLM Wilderness Area on the southeastern border, and
- land on the eastern border and most of the northern and southern border.

There are small tracts of private land on the northern and southern borders, many of which are used for low-density housing. The City of Twentynine Palms is to the south, and Joshua Tree National Park is seven miles south of the Combat Center. The National Park draws many tourists and contributes to the local economy.

3.15 Natural Resources Management Areas

Training areas are recognized by military units, and their use is tightly controlled. Management of natural resources dependent upon activities associated with military training (*e.g.*, protection of sensitive sites, predesignated range training support site designations) will use training area designations to avoid the need for military personnel to use a dual set of land units.

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4.0 NATURAL RESOURCES MANAGEMENT

This chapter includes management practices that directly affect soil, water, vegetation, and fauna. It includes overall program planning, wildlife habitat and population management to include endangered species, wet areas management, grounds maintenance, pest management, training land management, fire management, and protection of special interest areas.

Projects identified in this section are intended to be Environmental Program Requirements submissions to integrate implementation of this INRMP to the budget process (see Section 7.5). Each project has a goal(s). Project format is as follows:

Project: Title
Drivers: Needs to be satisfied in order for the mission to continue without disruption (see Section 1.2.2)
Funding Priority: Proposed or actual budget classification
Project Timing: Dates to be accomplished, by objective (*e.g.*, 2002, 2002-04, indefinitely, uncertain)
Regulatory Approvals: Agencies with whom coordination is required
Vehicle for Project Implementation: Who will accomplish the project
Success Monitoring: How project success will be monitored

Following each project will be **Alternative 1 (Preferred)** which uses an objective(s) format to provide process descriptions that are compatible with adaptive management analyses and overall INRMP implementation monitoring processes. All goals and objectives are summarized in tabular format in Appendix 7.4.

Following each description of the Preferred Alternative will be brief descriptions of **Alternative 2 (No Action)** and **Alternative 3 (Enhanced Stewardship)** (see Section1.7.4). Finally, brief descriptions of management options that were eliminated (**Other Options Eliminated**) are presented.

4.1 Coordinated Planning

As discussed in Section 1.6 and Chapter 2, MAGTFTC has much in common with other local, state, and federal agencies, municipalities, other military reservations, and other parties interested in the Mojave Desert. Cooperating with other organizations to manage and protect the Mojave Desert ecosystem is a significant commitment.

4.1.1 Project - Ecosystem Management Coordination

Project: Ecosystem Management Coordination
Drivers: Participation in regional initiatives; Sikes Act compliance; Endangered Species Act compliance; Stewardship
Funding Priority: Class 1
Project Timing: All objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: External support and in-house

Success Monitoring: Completion of objectives

4.1.1.1 Alternative 1 (Preferred)

Goal 1. Use coordinated planning to manage natural resources to sustain the military training capability.

Objective. Coordinate natural resources planning with planning for the sustainment of the military mission.

Goal 2. Promote and participate in regional planning for natural resources conservation at scales larger than the Combat Center.

Objective 1. Continue to coordinate with and support regional planning and programs, such as the Desert Tortoise Recovery Plan, California Desert Conservation Area Plan, West Mojave Coordinated Management Plan, Northern and Eastern Mojave Planning Effort, Mojave Desert Ecosystem Program, and the Desert Manager's Group.

Objective 2. Provide data and other input to regional Mojave Desert conservation programs.

Objective 3. Continue to coordinate with and support military regional planning and programs, such as Planning and Coordination of Interagency Desert Environmental Resource Managers, Mojave Desert Environmental Policy and Planning Board, Joint Western Regional Environmental Coordinators, and the West Coast Regional Review Board.

4.1.1.2 Alternative 2 (No Action)

Alternative 2 would be similar to the Preferred Alternative.

4.1.1.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

4.1.1.4 Other Options Eliminated

There is no reason not to coordinate the MAGTFTC natural resources program with other regional initiatives, and the installation is encouraged to do so via Department of Defense instructions and policies, as well as ecosystem management strategies. However, such coordination is not legally mandated, so it could be done at a lesser intensity or not at all. Since the installation participates in all appropriate regional planning efforts, a greater degree of coordination is not necessary.

There is no reason not to internally integrate the MAGTFTC natural resources program, and the installation is encouraged to do so via Marine Corps policies, as well as ecosystem management strategies.

4.1.2 Project - INRMP Review and Update

Project: INRMP Review and Update
Drivers: Sikes Act compliance; Stewardship
Funding Priority: Class 1
Project Timing: Objective 1 - annually; Objective 2 - 2006 (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: External support and in-house
Success Monitoring: Completion of objectives

Goal 1. Maintain the INRMP process to plan and integrate natural resources management on the Combat Center and comply with the Sikes Act.

4.1.2.1 Alternative 1 (Preferred)

The Sikes Act requires that military installations prepare and implement INRMPs with revisions no less often than every five years.

Objective 1. Review this INRMP annually, and if needed, coordinate changes with the USFWS and CDFG.

Objective 2. Update this INRMP within five years, in coordination with the USFWS and CDFG.

4.1.2.2 Alternative 2 (No Action)

Alternative 2 would be identical to the Preferred Alternative.

4.1.2.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be identical to the Preferred Alternative.

4.1.2.4 Other Options Eliminated

There are no options to a 5-year update to this INRMP in coordination with the USFWS and CDFG, per the Sikes Act. There is no formal legal requirement for annual reviews, so they could be done more or less often than proposed.

4.2 Forest Management

The Combat Center has no forest resources.

4.3 Agricultural Outleases

MAGTFTC has no agricultural outleases. There are no plans to institute such leases since they are not compatible with the military mission or ecosystem management strategies.

4.4 Habitat Management

Habitat management is accomplished through focused wildlife habitat management projects, training land management, wet areas management, fire management, and similar programs. The following sections describe the focused wildlife habitat programs and projects. All other activities are described in their corresponding sections of the INRMP.

4.4.1 Project - Flora Inventory and Monitoring

Project: Flora Inventory and Monitoring
Drivers: Endangered Species Act compliance; Stewardship; Participation in regional initiatives
Funding Priority: Class I
Project Timing: Objectives 1-2 - ongoing indefinitely; Objective 3 - 2004; Objective 4 - uncertain (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: External support and in-house
Success Monitoring: Completion of objectives

Goal. Inventory the Combat Center floral resources and monitor species or communities that are components of tortoise habitat, indicators of ecosystem integrity, capability of lands to support military missions, status of sensitive species or communities, and other special interests.

4.4.1.1 Alternative 1 (Preferred)

Flora Surveys

The Natural Resources Management Plan (University of California, Riverside, 1993) contains considerable information on the flora of the Combat Center. Its description of vegetation types and composition (Appendix E), vegetation map (Appendix F), annotated list of plant species (Appendix G), distribution of plants by training range (Appendix H), plants collected with distribution by 10 km cells (Appendix I), list of rare plants (Appendix J), and field list of plants (Appendix K) are useful both as benchmarks for future comparisons and as basic references for current and future management and studies.

A rare plant and floristic inventory (Elvin, 2000) added information on individual plant species as did the LCTA inventory (Section 4.9.1.1.1).

A reference plant collection is useful for both in-house Natural Resources personnel and for use by others doing studies at the Combat Center. The LCTA program has developed a herbarium collection, that includes a laminated sample of each plant species with pertinent information on each laminated sheet.

Objective 1. Update the flora inventory (including herbarium mounts) as new species are found during LCTA surveys, site-specific surveys, sensitive plant species surveys, and other projects.

Objective 2. Develop and maintain a computerized plant checklist.

Vegetative Mapping

The plant communities map (Figure 3.12.2) is generally adequate for the Combat Center natural resources needs during 2002-2006. This map should be updated at least every five years, and aerial photographs scheduled for 2004 (Section 4.9.1.1.3) would support this purpose. MAGTFTC is coordinating with the National Aeronautics and Space Administration (NASA) and the Strategic Environmental Research Development Program (SERDP) to use remote sensing for automatic updating of vegetation maps of the Combat Center. These projects could significantly improve cost/benefits of this mapping.

Objective 3. Update vegetation map by 2004.

Objective 4. Continue to work with NASA and SERDP to efficiently use remote sensing to monitor changes in vegetation communities on the Combat Center.

4.4.1.2 Alternative 2 (No Action)

Alternative 2 would be similar as the Preferred Alternative with the possible exception of Objective 3, that is not included in the Multiple Land Use Management Plan. Under Alternative 2, vegetative mapping would be similar to the Preferred Alternative.

4.4.1.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

4.4.1.4 Other Options Eliminated

The option to not maintain or expand this inventory is viable. At the other extreme, MAGTFTC could expend a great deal of effort specifically developing a more complete floral inventory. However, considering that the existing floral inventory is growing as a by-product of other vegetative projects, the current level of inventory adequately supports the overall natural resources program.

There is no legal requirement for maintaining an updated vegetation map of the Combat Center. Thus, the option to not update or improve this spatial database is viable. Considering that MAGTFTC is using or experimenting with state-of-the-art technology and planning 5-year updates, it is difficult to justify more detailed or frequent vegetation mapping updates.

4.4.2 Project - Habitat Management

Project: Habitat Management
Drivers: Stewardship; Participation in regional initiatives
Funding Priority: Class 2
Project Timing: Objective 2 - by 2003; other objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: Society for the Conservation of Bighorn Sheep, possible other external support, and in-house

Success Monitoring: Completion of objectives

Goal 1. Utilize landscape level planning to alter limiting factors and promote priority endemic species.

Goal 2. Base species management priorities on conservation needs as defined by global, regional, and local abundance; distribution and threats; population trends; importance of areas to species; potential for population and/or habitat management; and human interests.

Below habitat management practices on the Combat Center are categorized as a means to discuss them. However, there is overlap within these sections as well as with other sections of this INRMP.

4.4.2.1 Alternative 1 (Preferred)

Water Guzzlers

Water is a major limiting factor in the distribution of bighorn sheep. CDFG installed a guzzler in Bullion Training Area in 1991 to support the introduction of bighorn sheep to the Combat Center. In 1998 this guzzler was modified, and in 1999 the Society for the Conservation of Bighorn Sheep constructed a second guzzler in Bullion Training Area.

These guzzlers are beneficial to other wildlife species as well as bighorn sheep. They can, for example, be modified with larger drinking cups to promote use by bats.

Objective 1. Support the maintenance of the two guzzlers by the Society for the Conservation of Bighorn Sheep.

Objective 2. Evaluate the cost:benefits of modifying existing guzzlers to better accommodate bats and other species.

Other Habitat Management

There are virtually limitless options to manage wildlife in general, ranging from intensive, species-specific programs to general Combat Center-wide provisions to minimize impacts to these species in many areas. MAGTFTC, in general, has chosen the latter strategy to manage for the broadest range of species consistent with its primary military mission and available funding.

MAGTFTC has inventoried bats and their roosts and has installed four bat gates in three mines in recent years.

Sensitive species management (sections 4.5.3.1 and 4.5.4.3.1), wet area protection and management (Section 4.6), air quality (Section 4.8), training land management (Section 4.9.2), fire management (Section 4.12), special interest area habitat protection measures (Section 4.13), and effective environmental awareness programs (Section 5.2) will benefit wildlife in general, consistent with ecosystem management strategies. As has been stated before, land disturbance prevention is the key to natural resources management at the Combat Center. This is certainly true regarding wildlife habitat management.

Objective 3. Consistent with mission requirements, minimize vegetation loss in washes and canyons with desert willow (*i.e.*, Wood Canyon, southwestern Lavic Lake Training Area, Rainbow Canyon, Petroglyph Wash in Lava Training Area), which are relatively scarce on the Combat Center; maintain healthy xeroriparian washes and canyons throughout the Combat Center for use by resident and passerine migrant bird species and other wildlife.

Objective 4. Consistent with military mission requirements, conserve bat foraging habitat, (*i.e.*, washes, canyons, and water sources).

4.4.2.2 Alternative 2 (No Action)

Alternative 2 would be similar to the Preferred Alternative for the guzzlers and Wood Canyon management. Objective 3 (disturbance minimization) was not identified in the Multiple Land Use Management Plan and would not be a part of Alternative 2.

4.4.2.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would include a continuation of packrat midden analyses, which would provide an historical account of plant density and distribution. This general study would be valuable for tortoise ecological understanding as well as studies of other species' diversity, density, and population trend analysis.

4.4.2.4 Other Options Eliminated

There is no legal requirement to maintain or protect guzzlers. There are some "purist" strategies that would preclude the use of artificial watering devices in the desert. The installation could work with the CDFG to remove them. There is also the option to install additional guzzlers. Consistent with the military mission, many areas (including all of the Combat Center) could be considered for vegetation disturbance minimization.

4.5 Wildlife Population Management

Ecosystem management requires that all native species be maintained in areas that can support them. MAGTFTC is taking appropriate steps via this INRMP and numerous studies and reports that have preceded it to ensure that overall biodiversity is not compromised at the Combat Center. Wildlife population management directly influences populations as opposed to the soil, water, and vegetation management practices and protective measures which indirectly affect populations, as discussed in other sections of this INRMP.

General Goal. In accordance with mission needs, maintain wildlife populations at optimal levels in accordance with species priorities, population ecology, population health considerations, and habitat capacities.

4.5.1 Game Management

Game harvest is controlled by the CDFG per Title 14, CAC, which establishes regulations for fish and wildlife harvest on military lands. MAGTFTC prohibits hunting per CCO 5090.1B. The feasibility of a hunting program is being reviewed and may be established on the installation if viable. However, it is unlikely that the scientific studies and NEPA documentation would support such a program at the Combat Center.

4.5.2 Project - General Wildlife Inventory and Monitoring

Project: General Wildlife Inventory and Monitoring
Drivers: Stewardship; Participation in regional initiatives; Potential Endangered Species Act compliance
Funding Priority: Class 2
Project Timing: Objective 13 - 2002; Objective 14 - 2002-03; Objectives 1 and 11 - 2003; Objective 3 - 2005; Objective 4-6 and 12 - by 2006; Objectives 2 and 7-9 - ongoing indefinitely, Objective 10 - uncertain (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: External support and in-house
Success Monitoring: Completion of objectives

Goal. Inventory the Combat Center faunal resources and regularly monitor species that are indicators of ecosystem integrity and other special interests.

4.5.2.1 Alternative 1 (Preferred)

Ecosystem inventory began at the Combat Center in the early-mid 1980s (Fromer and Dodero, 1982; Fromer *et al.*, 1983; Kirtland, 1984; Kirtland, 1985; Scheidlinger and Zedler, 1982; Stewart and Baxter, 1987). Many of these efforts were peripheral to studies on the desert tortoise. The first overall fauna survey was in 1988-91 in preparation for the *Natural Resources Management Plan* (University of California, Riverside, 1993). This was followed by surveys for bats and neotropical migrants. Cutler *et al.* (1999) added considerably to the Combat Center faunal inventory.

The *Natural Resources Management Plan* (University of California, Riverside, 1993) contains several lists that summarize most studies and other surveys done on or near the Combat Center prior to 1993. Included in that plan are Table 2-2, which lists known or suspected rare or sensitive vertebrate animals; Appendix A, is an annotated list of vertebrate animals known or expected to occur at the Combat Center; Appendix B, includes observations of vertebrate animals at the Combat Center during 1988-1991; Appendix C, has information on the status and distribution of the desert tortoise at the Combat Center; and Appendix D, includes information and management notes on rare or sensitive vertebrate animals other than the desert tortoise. Krzysik and Trumbull (1996) have additional information on wildlife species observed during their work at the Combat Center. The San Bernardino County Natural History Museum completed a bird inventory of Mainside and Wood Canyon in 1997, as part of the Partners in Flight program.

More recently, Brown and Berry (1998) completed a bat survey for the Combat Center, and Cutler *et al.* (1999) completed *A Wildlife Inventory and Management Recommendations for the Marine Corps Air Ground*

Combat Center, Twentynine Palms, California. Since this latter document assimilates previous studies, this report is the best source of information regarding fauna at the Combat Center. Section 3.13 summarizes this information. Many monitoring objectives (below) were developed using this report.

Mammals

Objective 1. Considering potential impacts of bats on the MAGTFTC mission, repeat bat survey using state-of-the-art acoustical analysis technology by 2003.

Objective 2. Continue to add to the small mammal baseline inventory using observations and data from other field projects, emphasizing the pallid San Diego pocket mouse.

Objective 3. Jointly monitor the bighorn sheep population at the Combat Center with CDFG to determine sheep distribution, abundance, and other population parameters by the end of 2005.

Objective 4. Use remote cameras to monitor the use of natural and artificial water sources by large mammals (including bighorn sheep).

Birds

Objective 5. Due to their high biodiversity value, map locations of xeroriparian washes and canyons that contain desert willow, catclaw, or smoke tree throughout the Combat Center and note their relative condition (*e.g.*, poor, good, or excellent).

Objective 6. Inventory burrowing owl populations throughout the Combat Center, especially in sandy flats in the southwestern corner of the base (*e.g.*, Sand Hill, Acorn, Emerson Lake, and West training areas); monitor nesting success.

Objective 7. Continue to add to the avian baseline inventory using observations and data from other field projects.

Fish

Only one fish species is known at the Combat Center, the mosquitofish, that is very common in freshwater drainage channels and pools around Mainside (University of California, Riverside, 1993). There are no plans to inventory for additional fish species or to monitor this species in 2002-2006.

Reptiles and Amphibians

Objective 8. Monitor amphibian populations at water sources.

Objective 9. Considering that the species is being considered for federal listing, continue to identify potential Mojave fringe-toed lizard habitat (sand sheets, sand dunes, and small sand accumulations) throughout the Combat Center. Use walking surveys to inventory potential habitat and determine their distribution and relative abundance. Monitor Mojave fringe-toed lizard populations and the condition of their habitat, and

protect populations from excessive off-road vehicle use.

Objective 10. Continue to cooperate with San Diego State University project (a part of the DoD SERDP) to develop long-term monitoring protocols for reptiles over a broad range of Mojave Desert conditions (various disturbances levels and habitat fragmentation).

Objective 11. Survey for the chuckwalla and determine its Combat Center distribution.

Objective 12. Continue to add to the amphibian and reptile baseline inventory using observations and data from other field projects.

Invertebrates

Objective 13. Inventory fairy shrimp and other aquatic invertebrates to determine species composition and distribution.

Objective 14. Inventory terrestrial invertebrates to determine species composition and distribution.

4.5.2.2 Alternative 2 (No Action)

The Multiple Land Use Management Plan calls for the establishment of a Monitoring Avian Productivity and Survivorship station at the Combat Center and more intensive survey of neotropical birds. This alternative would also include support for bighorn sheep monitoring. This alternative would also include the use of other field projects to incidentally add to the Combat Center faunal inventories.

4.5.2.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would include an aerial infrared population assessment of bighorn sheep on MCAGCC. New technologies allow aerial population density and distribution monitoring of large mammals by recording images through an infrared video camera lens. Costs of this technology are expected to decrease in future, making this project more feasible.

4.5.2.4 Other Options Eliminated

None of the above projects involving the collection of faunal inventory and related data is required by law. Surveys for species that are monitored for biodiversity or special interest purposes (*e.g.*, bats, bighorn sheep, amphibians, burrowing owls, Mojave fringe-toed lizard, fairy shrimp) could be decreased or dropped, or they could be increased in terms of geographical areas surveyed or survey intensity. It is a matter of budgets, personnel, and species priority, not legal requirements.

There are numerous other fauna inventory and monitoring techniques available for use in the Mojave Desert. These could be used to any degree on the Combat Center. However, considering declining DoD budgets and increasing compliance requirements, it is unlikely that significantly more faunal surveys or monitoring programs can be justified for species that are not listed.

4.5.3 Project - General Wildlife Management

Project: General Wildlife Management
Drivers: Stewardship; Participation in regional initiatives
Funding Priority: Class 3
Project Timing: All objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: In-house
Success Monitoring: Completion of objectives

Goal. Consider State-protected and other nonfederally-listed species in MAGTFTC actions.

4.5.3.1 Alternative 1 (Preferred)

State-protected Species

MAGTFTC understands the importance of sensitive species that may not be federally-listed, particularly since these species may have the potential to become federally-listed. MAGTFTC will take into account State-listed species (sections 3.12.5 and 3.13.6) in developing management strategies per 16 USC 1535 and 16 USC 1540.

Objective 1. Minimize Mojave fringe-toed lizard mortality and injury during off-road vehicle use, consistent with mission needs.

Objective 2. Consistent with mission requirements and funding availability, give consideration to State-protected species and birds of prey in all Marine Corps actions.

Furbearer/Predator Management

Commercial or sport hunting or trapping of furbearers or predators is prohibited on the Combat Center. The only predator management expected to occur on the Combat Center would be actions taken specifically to protect the desert tortoise (Goal 5, Objective 4, Section 4.5.4.3.1).

Other Species Management

Most species management on the Combat Center is directed towards the desert tortoise, the only listed species, primarily due to compliance requirements. However, the desert tortoise is a very small part of the installation biodiversity. Conservation measures for this species also benefit many other species of wildlife on the installation.

The "experimental" bighorn sheep population introduced at the Combat Center in 1991 is believed to be stable and is expected to increase in numbers over the next several years. Two major causes for anticipated population and habitat expansion are the construction of a second drinker device (guzzler) and the rapidly expanding population in the Sheephole Mountains southeast of the America Mine Training Area. Sheep are expected to disperse in several directions, including onto DoD lands over the next several years. After a

hiatus on hunting for several years in the Sheephole Mountains, hunting is being re-instituted there. Population surveys planned for fiscal years 2002 and 2003 will help to clarify population trends.

Objective 3. Protect all species listed by any federal or state law from illegal harvest.

Objective 4. Continue to discourage collecting or killing reptiles in training areas.

Objective 5. Rehabilitate, whenever possible, injured wildlife, particularly species protected by federal law.

Objective 6. Use results of bighorn sheep surveys to determine management needs for this species.

4.5.3.2 Alternative 2 (No Action)

Actions for State-listed species were not mentioned in the Multiple Land Use Management Plan; thus, specific actions to manage or protect State-listed species would not be accomplished under Alternative 2. Alternative 2 would be the same as the Preferred Alternative for other wildlife species.

4.5.3.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would include density and distribution surveys and population trend analyses for species listed by the State of California but not federally-listed and California Species of Concern that are not federal Species of Concern. This alternative could include any or all of these species.

4.5.3.4 Other Options Eliminated

MAGTFTC is not legally required to specifically manage State-listed species. Thus, even though Marine Corps Order P5090.2A encourages consideration for these species, the option to accomplish no specific projects for State-listed species is viable. However, many actions for State-listed species are coincidental with actions for the desert tortoise; thus, as described in the discussion of Other Options Eliminated for the federally-listed species, options are only available after consultation with the USFWS. There are many options for managing sensitive plants on the Combat Center ranging from complete protection of populations to no protection.

MAGTFTC could open its lands to furbearer trapping or predator hunting. However, neither option is viable due to a lack of demand for very limited furbearer resources and incompatibilities with the military mission.

MAGTFTC is not legally required to specifically manage other species. However, it is required to protect most nongame species, including those federally-listed. Thus, as described in the discussion of Alternative 3 for the tortoise, some other options are only available after consultation with the USFWS.

4.5.4 Endangered, Threatened, and Other Species of Special Concern

This section includes population and habitat management of endangered, threatened, and other species of special concern, unless they have been discussed elsewhere. The Marine Corps has five primary requirements under the Endangered Species Act:

- to conserve listed species,
- not to "jeopardize" listed species,
- to "consult" and "confer",
- to conduct a biological assessment, and
- not to "take" listed fish and wildlife species or to remove or destroy listed plant species without a permit.

MAGTFTC is committed to these five primary requirements.

4.5.4.1 Status of Sensitive Species

The desert tortoise is the only federally-listed species documented for the Combat Center. Information on this species is summarized in Section 3.13.6. About 97% of the Combat Center has been surveyed for the desert tortoise. Information collected is summarized in the *Technical Synthesis Report for a Desert Tortoise Survey on the Marine Corps Air Ground Combat Center* (Jones & Stokes Associates, Inc., 1998) and *Biological Assessment: Effects of Training and Land Use at Marine Corps Air Ground Combat Center, Twentynine Palms, on the Desert Tortoise (Gopherus agassizii)* (Snover and Kellogg, 1999). A report is being completed for tortoise surveys in Sand Hill, West, Acorn, and Range training areas.

Sections 3.12.5 and 3.13.6 discuss the status of the Combat Center species that are federal-, California-, or California Native Plant Society-listed.

4.5.4.2 Desert Tortoise Background

MAGTFTC has submitted the *Biological Assessment: Effects of Training and Land Use at Marine Corps Air Ground Combat Center, Twentynine Palms, on the Desert Tortoise (Gopherus agassizii)* (Snover and Kellogg, 1999) to the USFWS. This Assessment describes training and land use at the Combat Center, tortoise mitigation strategies, the regional and environmental setting, and effects of training and land use on the tortoise. A brief summary of the listing status, regional tortoise management strategies, tortoise biology, and densities of tortoises at the Combat Center is presented in Section 3.13.6.

This INRMP serves as the Interim Endangered Species Management Plan for the desert tortoise at the Combat Center. When the Biological Opinion is issued by the USFWS, this INRMP will be modified as required to accommodate requirements within the Biological Opinion. At that point, this INRMP will become the Endangered Species Management Plan for the Combat Center. Required provisions within the Biological Opinion will replace any below-described desert tortoise management actions that are in conflict with the Biological Opinion.

Jones & Stokes Recommendations

Jones & Stokes Associates, Inc. (1998) added considerable knowledge regarding the desert tortoise on the Combat Center. This report provided recommendations for the management and protection of desert tortoises aboard the Combat Center. MAGTFTC has reviewed these recommendations and will consider them in future management actions.

Critical Habitat

On February 8, 1994 the USFWS published a final rule in the Federal Register (59 CFR 5820) designating 6.4 million acres of critical habitat for the Mojave population of the desert tortoise (*Gopherus agassizii*). No critical habitat was designated on the Combat Center.

Special Use Area

A Special Use Area, approximately 7,300 acres, was established in 1991 in the northeastern portion of Sand Hill Training Area. This area has limitations on some types of military operations, and off-road travel is not authorized. Signs warning of no off-road travel is permitted are placed at regular intervals along MSRs, and off-road violations have been reduced significantly.

Tortoise Mortality Minimization

Training activities may result in injury or death to desert tortoises. The Biological Assessment (Snover and Kellogg, 1999) lists five specific steps taken to minimize such impacts. In addition, various limitations on military training imposed by natural topography, proximity to population centers, archeological sites, and the Special Use Area greatly minimize direct impacts of military training on tortoise injury or mortality. About 351,381 acres (59% of the Combat Center) are in these categories (Snover and Kellogg, 1999).

Common raven populations have been increasing in the Mojave Desert. Data from the USFWS Breeding Bird Survey program from 1968 to 1992 shows a tenfold increase in raven numbers in the Mojave Desert (Boarman and Berry, 1994). The Combat Center is attractive to ravens due to road kills, permanent water supplies, supplementary food at the landfill, and permanent structures for raven nesting and roosting sites. Because ravens are known to prey on juvenile desert tortoises, increases in raven populations could have negative impacts on desert tortoise populations on the Combat Center.

Coyotes are also known predators of desert tortoises (USFWS, 1990). Much of the above discussion pertains to coyotes as well as ravens. The Biological Assessment (Snover and Kellogg, 1999) discusses other known or potential tortoise predators, including foxes and feral dogs. MAGTFTC supported a study by Utah State University (Bjurlin and Bissonette, 2001) that investigated the nesting biology and early demographics and survival of neonates. This report recommends the control of dogs in areas with high tortoise densities.

Tortoise Studies

The desert tortoise population has been, and is, being studied intensively. MAGTFTC has sponsored at least 13 studies on the desert tortoise aboard the Combat Center since 1983 (U.S. Marine Corps, 2000). The University of California, Riverside (1993) reported the population of this threatened species as "stable." Jones & Stokes Associates, Inc. (1998) and Gardner and Brodie (2000) studied tortoise density in most training areas and better defined relative tortoise densities, including sub-optimal habitats. Their results are summarized in Section 3.13.6. Permanent study plots and their use are described in sections 3.13.6 and 4.5.4.3.1.

Tortoise Habitat Protection

The training land management project (Section 4.9.2) outlines steps MAGTFTC is taking to protect its training lands from undue disturbance. These programs are important to the protection of desert tortoise habitat, as noted in the Biological Assessment (Snover and Kellogg, 1999). The Biological Assessment lists specific commitments of MAGTFTC to protect tortoise habitat (see Proposed Mitigation, below).

Environmental Awareness

Chapter 7 describes environmental awareness programs on MCAGCC. Many of these are directed specifically toward tortoise protection. The biological assessment (Snover and Kellogg, 1999) lists five specific awareness actions to protect the tortoise on the Combat Center. These are incorporated in the Mission Awareness program (Section 5.2.1).

Effects of MAGTFTC Activities on the Desert Tortoise

The Biological Assessment (Snover and Kellogg, 1999) describes impacts of Combat Center activities on the desert tortoise. Of the less than half of Combat Center lands that could be considered potentially suitable habitat for tortoises, neither wildfires nor Upper Respiratory Tract Disease are significant threats to tortoises, but they could become important. Dogs, ravens, coyotes, loggerhead shrikes, roadrunners, and kit foxes may be significant tortoise predators.

MCAGCC facility development, main road use, air operations, artillery firing, noise, and small arms range operations will not likely significantly affect tortoise populations. Large munitions impacts (*e.g.*, bombs, artillery, tanks) should have little direct impact on populations, but there will be indirect and cumulative impacts in the form of habitat degradation through loss of plants and soil disturbance in areas already highly disturbed. Direct mortality and injury from military and maintenance activities are likely to be rare. Operations in areas not already disturbed can degrade habitat or prevent or slow tortoise habitat recovery. Landfill or urban expansion removes habitat and increases predation risks.

Proposed Mitigation Measures

The Biological Assessment includes the following proposed mitigation measures to reduce the potential for death or injury to individual tortoises, reduce or minimize disturbance of tortoise habitat, and monitor the take of desert tortoises:

General

1. The MAGTFTC Commanding General will appoint an official Installation Representative who shall be responsible for compliance with all mitigation measures agreed upon by MAGTFTC and the USFWS. This person will receive and investigate reports of noncompliance with the Endangered Species Act, including mitigation measures listed in the Biological Opinion, and shall have the authority to stop all activities that may be in violation of the Endangered Species Act and/or these measures.

2. MAGTFTC will continue its tortoise education program for military and civilian personnel, including all military personnel coming on board to train and all contractors working outside of Mainside. The program will include, at a minimum, the following topics: occurrence of desert tortoises, sensitivity of the species to

human activities, legal protection for desert tortoises, penalties for violations of federal laws, general tortoise activity patterns, reporting requirements, measures to protect tortoises, and personal measures users can take to promote the conservation of desert tortoises. All personnel will be informed of their responsibility to report any form of take to the Installation Representative. As funding allows, MAGTFTC will continue developing education and compliance aids, such as the Desert Tortoise Alert Cards and Desert Tortoise Brochure. Tortoise education programs will also include problems caused by uncontrolled dogs.

3. To the extent possible, military activity that causes increased surface disturbance from that described in the Environmental Baseline (such as Forward Arming and Refueling Points and targets) will be concentrated on areas that have already been delineated as high disturbance with very low tortoise densities.

4. Areas of known moderate to high tortoise density, if not already restricted, will be avoided by most ground disturbing activities to the extent possible.

5. MAGTFTC will require that all camouflage netting be staked 18 inches off the ground to prevent desert tortoise entanglement.

6. Explosives Ordnance Disposal personnel will assist in monitoring "take" as part of their clean-up sweeps.

7. As funding allows, MAGTFTC will continue its ongoing research and management programs, as identified in the revised Desert Tortoise Management Plan and Multiple Land Use Management Plan (both within this INRMP), such as studies on desert tortoise predation and ecology of tortoises in mountainous habitats. (Note: Both examples are completed.)

8. The USFWS will be notified in writing by the Installation Representative within three working days of the discovery of any tortoise death or injury caused by military training or construction activity. Notification will include the date, time, circumstances, and location of any injury or death. Dead animals will be left *in situ*. Injured animals will be taken to a qualified veterinarian.

Mission-Related Construction Or Maintenance Activities

1. All members of construction crews working outside of Mainside will receive desert tortoise education training prior to start of work from a qualified individual. This training will also apply to peripheral Mainside projects causing significant ground disturbance. Training will include recognition of the tortoise and what to do if a tortoise is encountered, review of pertinent laws and acts, and guidelines to reduce impacts, with emphasis on the tortoise. All personnel will be issued Desert Tortoise Alert Cards.

2. Contractor and maintenance personnel will remain on main or secondary MSRs whenever possible, exiting off MSRs only when no other route exists to the objective.

3. Prior to any new ground disturbance from construction of buildings, new or improved fixed ranges, new or improved MSRs, in areas with desert tortoise densities greater than 20 per square mile, pre-construction clearance surveys conforming to USFWS 1992 protocols will be conducted by qualified biologists. For these actions, biological monitors will be approved by and report to the Installation Representative. Monitors will work with the construction supervisor to minimize disturbance. All monitors shall conduct pre- and post-construction surveys and shall be present at all times during construction. Monitors shall also check any open

trenches two times a day, in the morning and evening, throughout the duration of construction. Because of the lack of habitat and the level of existing development, Mainside will be exempt from survey, clearance, and monitoring requirements, with exception of projects directly adjacent to or spanning boundaries between Mainside and West or East training areas.

4. Outside of Mainside, construction of new facilities, MSRs, new in-ground targets, and new or upgraded fixed ranges that disturb more than 500 acres will require the re-initiation of Section 7 Consultation. Re-initiation of Section 7 consultation will be required when such activities consume less than 500 acres but occur in areas with desert tortoise densities of greater than 50 per square mile.

5.a. During pre-construction clearance surveys, all desert tortoise burrows, as well as mammal burrows of suitable size for use by desert tortoises, shall be inspected. An appropriate disinfectant shall be used to clean the inspection equipment (*i.e.*, fiberoptic scope) after each burrow is inspected. Wherever feasible, active burrows shall be flagged and avoided. Tortoises within burrows that cannot be avoided shall be excavated by hand by qualified biologists. In the course of handling animals, all appropriate information (*i.e.*, weight, length, width, height, sex, apparent health, identification number) shall be collected. Tortoises excavated from active burrows shall be relocated to unoccupied natural burrows or artificial burrows. Relocation burrows should be as close as possible to original burrows but in areas where affected tortoises will be protected from any further disruption resulting from construction activity. Tortoises that are encountered shall be held until temperatures have dropped to or below 90°F before being released. Any tortoise held shall be placed in a new cardboard box that has not previously contained a tortoise. Boxes shall be used once and then destroyed.

b. Desert tortoises that are moved from within a construction site during clearance surveys will be marked for future identification. An identification number (using indelible ink) shall be placed on the fourth vertebral scute using the acrylic paint/epoxy technique. If any tortoises are found within a construction area after the initial removal of tortoises, all construction activities shall cease until the tortoise has been marked and removed by a qualified biologist.

c. Inactive burrows that will be not be crushed or destroyed by construction activity, but are within the working strip, shall be blocked or covered, flagged, and avoided. After completion of all construction activities, any materials used to block or cover the entrance, as well as flagging materials, shall be removed. Only those burrows that will actually be crushed or destroyed in the construction process shall be collapsed in pre-construction surveys.

d. All desert tortoise handling and relocations shall be completed in accordance with Desert Tortoise Council guidelines (revised 1999). All personnel involved in these activities must be approved by the USFWS and must possess an appropriate research permit when needed. Non-government employees shall be encouraged to obtain approval from the CDFG in addition to the USFWS.

6. All personnel operating vehicles within tortoise habitat on or around a construction site will inspect underneath parked vehicles prior to moving a vehicle. If a desert tortoise is beneath the vehicle, the biological monitor will be contacted to remove the animal from harm's way.

7. No pets will be permitted at any time within desert tortoise habitat. Military working dogs will be permitted when under control of their handlers.

8. All ground personnel that enter construction areas will be required to remove all food stuffs, trash, or other waste that may attract predators. Any trash receptacles used for extended stays will be equipped with latching/locking lids.

9. All roads entering tortoise habitat at construction sites will be posted with speed limits of 20 miles per hour.

Biological Assessment Conclusions

The biological assessment (Snover and Kellogg, 1999) concludes the following:

- continued military use of the area reduces many adverse effects on the tortoise;
- the current and past record of the Marine Corps in funding desert tortoise research has and will continue to greatly enhance conservation efforts on the Combat Center and elsewhere;
- the proximity of extensive protected areas reduces the importance of the Combat Center to the continued survival and recovery of the desert tortoise, as evidenced by the fact that a portion of Sunshine Peak Training Area was omitted from critical habitat designation because further review showed it to be nonessential to the recovery of the species;
- effects of military training on the tortoise, when viewed in the context of probable alternatives to military use are less destructive than might be expected with private or other public ownership of noncritical habitat;
- the fact that tortoises persist throughout the Combat Center after 50 years of military training suggests that they can continue to persist despite a military presence;
- proposed mitigation will reasonably avoid or minimize a majority of the potential take of the desert tortoise due to ongoing and anticipated military actions;
- the land is protected from most effects on the tortoise and possible habitat conversion by its withdrawal status;
- incidental take, particularly due to off-road training, may occur on occasion;
- the highest densities of tortoises occur in areas that experience the lightest training pressures;
- the 122,000 acres of mountainous terrain have few, if any, training impacts; and
- overall, the Combat Center is marginal tortoise habitat, at best.

The Combat Center maintains five plots for long-term tortoise studies, including population parameters. Two plots, established in 1985-86, are in Sand Hill Training Area; two others, established in 1990-91, are in Emerson Lake and Cleghorn Pass Training Areas; and one, established in 2000 (moved from Lava Training Area), is in the southern Bullion Training Area. All plots are in areas of moderate-high tortoise density.

4.5.4.3 Project - Federally-listed Species Management

Project: Federally-listed Species Management
Drivers: Endangered Species Act compliance; Stewardship; Participation in regional initiatives
Funding Priority: Class 1 for those items identified when the Biological Opinion is finalized. Class 3 for other objectives.
Project Timing: General objectives 1-2 - as needed; Goals 1, 2, 3 (all objectives) and Goals 4-5, objectives 3-6 - ongoing indefinitely; Goals 4-5, objectives 1-2 - following receipt of Biological Opinion (Appendix 7.4)
Regulatory Approvals: U.S. Fish and Wildlife Service

Vehicle for Project Implementation: External support and in-house
Success Monitoring: Completion of objectives

Goal 1. Comply with the Endangered Species Act and its implementing regulations at the Combat Center.

Goal 2. Inventory the Combat Center faunal resources and regularly monitor species that are indicators of ecosystem integrity and the status of sensitive species or communities.

4.5.4.3.1 Alternative 1 (Preferred)

General

Objective 1. Survey for federally-listed species and develop monitoring procedures for those which are found on the Combat Center.

Objective 2. If species that are federally-listed are found on the Combat Center or if species already known on the Combat Center are federally-listed, develop an inventory/monitoring program for these species.

Desert Tortoise

Inventory and Monitoring

Inventory and monitoring requirements for the desert tortoise may be modified when the USFWS issues a biological opinion in response to the MAGTFTC biological assessment.

Goal 1. Evaluate known and potential desert tortoise habitat.

Objective 1. Prepare a comprehensive inventory of desert tortoise-related habitat condition and health.

Objective 2. Identify at risk areas for desert tortoise habitat.

Goal 2. Monitor long-term tortoise population trends on the Combat Center.

Objective 1. Maintain established tortoise study plots.

Objective 2. Continue to long-term monitor desert tortoises on the established study plots on a 2-4-year rotational basis.

Objective 3. Initiate a long-term tortoise density and trend monitoring program using USFWS-approved protocols.

Objective 4. Establish and conduct line-distance transects in combination with those conducted on adjacent BLM lands.

Upper Respiratory Tract Disease Research

Goal 3. Cooperate with research on Upper Respiratory Tract Disease.

Objective 1. Cooperate with research on the cause of Upper Respiratory Tract Disease and possible cures.

Objective 2. Cooperate and serve as a test center for the development of an "in-the-field ELISA (Enzyme-Linked Immunosorbent Assay) Test" for determining the presence of Upper Respiratory Tract Disease in desert tortoises prior to relocation into possible non-Upper Respiratory Tract Disease-affected areas, including field-testing of methodologies.

Objective 3. Monitor tortoise health by conducting ELISA tests and other health assessment tests on a set of tortoises every 2-4 years. If transmittered tortoises are available, they would be ideal as their exposure rates could be monitored over time.

Management

Goal 4. To the extent possible, given the priority of the military mission and funding availability, protect and improve desert tortoise habitats and move toward increasing tortoise population growth using research, habitat management, awareness, and other methodologies above and beyond requirements of the Endangered Species Act.

Goal 5. Minimize injury and mortality of desert tortoises.

Objective 1. Implement required Reasonable and Prudent Measures within the Biological Opinion once received.

Objective 2. Implement Conservation Measures within the Biological Opinion once received, dependent upon available funding..

Objective 3. Maintain the study plots.

Objective 4. Continue non-native predator management regarding the desert tortoise.

Objective 5. Minimize road proliferation.

Objective 6. Implement desert tortoise-related awareness programs described in Section 5.2.1.

4.5.4.3.2 Alternative 2 (No Action)

Alternative 2 would be identical to those actions within the Preferred Alternative with regard to strict compliance with the Endangered Species Act. However, many tortoise-related actions within the Multiple Land Use Management Plans, particularly research, have been completed; thus, they would be dropped. Alternative 2 places strong reliance on implementation of a then-draft Endangered Species Management Plan, that was not completed. Alternative 2 would place more emphasis on land restoration than the Preferred Alternative. Under Alternative 2 research on the upper respiratory tract disease would not occur.

4.5.4.3.3 Alternative 3 (Enhanced Stewardship)

This alternative would include at least two projects.

Enhanced Tortoise Disease Monitoring. A compact laboratory would be created to allow on-site blood analysis and blood culture assessment. The level of cooperation and funding would be increased for the development of the field bio-assay strip for Enzyme-linked Immunosorbent Assay of Upper Respiratory Disease.

Desert Tortoise Cohort Analysis. This study would continue the Bjurlin and Bissonette (2001) study by monitoring 5-10 tortoise cohorts (nest groups) for 3-5 years after hatching.

4.5.4.3.4 Other Options Eliminated

There are no options with regard to managing the desert tortoise within requirements of the Endangered Species Act. When the Biological Opinion is issued by the USFWS, it will be MAGTFTC's compliance basis for modifying this INRMP. After that, additional modifications would require consultation with the USFWS. Thus, there are few options with regard to management of the desert tortoise and its habitat without considerable consultation and coordination.

There are many options to monitor and study population parameters of the desert tortoise on the Combat Center in greater detail than identified in the Preferred Alternative. However, considering the huge amount of research already accomplished on the Combat Center, a greater level of detail is not justified at this time.

4.6 Project - Wet Area Management

Project: Wet Areas Management
Drivers: Stewardship
Funding Priority: Class 2
Project Timing: Objective 2 - by 2006; all other objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: In-house
Success Monitoring: Completion of objectives

Goal: Manage wet areas to protect their significance to ecosystem functionality.

4.6.1 Alternative 1 (Preferred)

At the Combat Center each dry lake, significant dry wash, seep and spring, and man-made impoundment is important for both mission and biodiversity. Biological diversity, both plant and animal, is, by far, most related to closeness to water, even though in almost all cases this water is ephemeral.

The Combat Center Waters of the United States study (U.S. Army Corps of Engineers, 1994) identified four types of wet areas of special concern: playa lakes, dry washes, seeps and springs, and man-made water bodies.

Playas

The U.S. Army Corps of Engineers (Waterways Experiment Station) (1994) identified nine important playas on the Combat Center: Lavic Lake, Galway Lake, Emerson Lake, Upper Emerson Lake, Quackenbush Lake, Miller Dry Lake, South Miller Dry Lake, Deadman Lake, and Mesquite Lake. These playas recharge groundwater, were settings for cultural activities, and maintain intra/inter ecosystem integrity. These playas, when filled with water, attract wintering waterfowl and, when dry, are often populated with terrestrial birds and mammals provided adequate vegetative cover exists (Krzysik and Trumbull, 1996).

Two major impacts occur at the Combat Center playas, vehicular driving and bombing, most obvious at Lavic Lake. Driving has created compacted and rutted surfaces on many playas; Emerson, Deadman, and Lavic lakes each have over four miles of roads. The nine playas together have about 17 miles of roads. Only South Miller Dry Lake and Mesquite Lake are devoid of roads (U.S. Army Corps of Engineers, 1994).

Since this 1994 report, the berm on Mesquite Lake along the Combat Center boundary and the berm along the western boundary of Emerson Lake have been breached in several places to restore more natural water flows. Storm water retention ponds have been constructed above Deadman Lake to protect from Mainside runoff. MAGTFTC has identified a limited number of authorized crossing sites on Deadman Lake, the most heavily impacted lake. Signs have been placed to identify these crossings and close others.

Dry Washes

Dry washes serve as sediment transport corridors, maintain intra/inter ecosystem integrity, and were settings for cultural activities (U.S. Army Corps of Engineers, 1994). Dry washes are zones of high animal activity, including insects. This attracts birds and mammals. These washes also act as travel corridors for many species of desert dwelling wildlife.

Most impacts to dry washes are from vehicles that use them as trails. In 1994 there were about 76 miles of desert wash roads on the installation (U.S. Army Corps of Engineers, 1994).

Seeps and Springs

Seeps and springs can be valuable sources of water for wildlife when they are discharging. In general, the military mission is not adversely affecting these seeps and springs due to their generally inaccessible locations.

Man-Made Water Bodies

Man-made bodies of water at the Combat Center are important to migratory species. As the only permanent water areas on the installation, they support numerous resident wildlife species. These bodies of water also trap sediments and other compounds that run-off from roads and other facilities to keep them from entering Mesquite Lake.

Wet Area Inventory and Floodplain Delineation

MAGTFTC has no particular need for wet area surveys since all these areas (with the possible exception of small seeps or intermittent springs) are identified and few in number. The 100-year floodplain for the Combat Center was completed for Deadman and Mesquite playa lakes in 1997. There are no known needs for additional floodplain delineations.

Objective 1. Consistent with mission essential requirements, avoid off-road vehicle use of wet playa areas.

Objective 2. Evaluate the boundary trench and berm on Emerson Lake to determine cost/benefits of restoration.

Objective 3. Design tank traps to maintain the natural flow of water during run-off events consistent with the military mission.

Objective 4. Prepare, evaluate, and implement recommendations to repair disturbed washes, consistent with military mission requirements.

Objective 5. Update the GIS database if new seeps or springs are discovered.

Objective 6. Remove exotic, invasive species (see Section 4.11.1.2) and maintain representative native vegetation (trees and shrubs) around man-made bodies of water.

4.6.2 Alternative 2 (No Action)

Alternative 2 would be similar to the Preferred Alternative.

4.6.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

4.6.4 Other Options Eliminated

Projects that manage man-made impoundments are not mandated, so they are optional. Conversely, MAGTFTC could manage man-made impoundments and their surrounding vegetation to a greater extent than proposed.

4.7 Water Resources Management

Several sections of this INRMP involve water resources including Wet Area Management, Training Land Management, and Mainside Grounds Maintenance. MAGTFTC has a storm water pollution prevention plan that satisfies the requirements of the California Non-Point Source Pollution Control Plan. The Groundwater Resources Management Plan will address issues associated with groundwater, both present and future. This plan will be completed by the U.S. Geological Survey by 2002.

Mesquite basin is mostly salt water with very limited use potential. Surprise Spring is being drawn down significantly in portions of the aquifer close to retaining fault systems; other portions of the aquifer are not

showing significant drawdown due to very low movement of groundwater. Overall, recharge is inadequate to keep up with use, but current use is now more conservative than in the past. Water being used at the installation is about 20,000 years old; indicative of the lack of recharge.

Problems involved with water resources at the Combat Center are challenging. During 2002-2006 MAGTFTC will continue to conserve and protect from pollution known water sources and seek new sources of water. Combat Center Order 5090.1B includes measures to be taken by Marines and other forces training on the Combat Center to conserve and protect water resources.

Most water resources management programs are not within the Natural Resources Program at MAGTFTC and thus, are not pertinent to this INRMP. However, one specific item that can be accomplished is the removal of the invasive species throughout the installation. This action will both meet the goal of conserving water and the goal of enhancing biodiversity. See Section 4.11.1.2 for a discussion of this program.

4.8 Air Quality

Dust can be generated by the military mission directly or blown off denuded lands. In an undisturbed condition, native vegetation and the desert crust hold fine particles of soil in place. Removal of the vegetation and/or disruption of the crust exposes these particles, which become airborne particulate matter. Dust affects military training, but Marines must learn to operate within heavy dust conditions.

Issues associated with airborne particulate matter (dust) including the following:

- compliance with air quality laws;
- trail width proliferation resulting from vehicles trying to stay to the side, rather than behind, other convoy vehicles; and
- increased vehicle maintenance costs.

The usual method of minimizing dust is the re-vegetation of denuded lands. This is not a viable option at the Combat Center on a large scale (see Section 4.9.2.1.5). The installation completed a *Particulate Matter Emissions Survey Report* (ENSR Consulting and Engineering, 1994) that addressed the dust problem.

MAGTFTC responded to this report by installing five air monitoring stations, two on the east side of the base, two on the west side, and one on the north side. These stations are used to quantify the origins of the fine particulate dust at the Combat Center. Such information will be used to prioritize any needed corrective actions.

The following is a brief discussion of items considered in this report with updates as appropriate:

Unpaved Roads

Unpaved roads are one of the two largest sources of dust at the Combat Center. Philips Road was a significant problem with dust, until paved in the mid-1990s. The tank trail paralleling Philips Road was reduced in size in 1997, and partially concreted in 2000.

Several points seem pertinent to the control of dust from unpaved roads. Paving is a good solution for main access roads close to Mainside and along installation boundaries, especially those close to housing. The use of asphalt is hindered by the combination of high temperatures and the great weight of military equipment. Reducing the speed of vehicles near Mainside would help, but this causes scheduling problems because many vehicles must travel to and from range areas during short periods of time. MAGTFTC has implemented a 25 miles-per-hour speed limit on MSRs. Treating surfaces with water is contrary to water conservation, and the use of chemicals is very expensive. Vegetative wind breaks are neither practical nor cost effective on the scale needed.

Open Desert Activities

Mountains act as dust barriers at the Combat Center and keep the dust generated on the Combat Center within its boundaries. Prevailing winds also help keep dust from moving off-installation onto privately-owned lands, particularly developed lands. Some dust enters the Combat Center, particularly from Johnson Valley. MAGTFTC is in compliance with Clean Air Act standards, but it is in a nonattainment area for small particulates (PM10), due to noncompliance in San Bernadino County. Dry lake beds can produce dust during dry, windy conditions.

Open desert activities are the other source of dust at the Combat Center. Control options include mileage/speed controls, wind breaks, and restrictions on activities during high wind periods. Wind breaks are not a viable option. The other options affect military operations. One solution to reducing dust from open desert operations is to reduce vehicular speeds in very specific locations that are predisposed to excessive dust generation. Encouraging vehicles to stay on MSRs, unless required to travel off-road for tactical purposes, may reduce dust generation.

Paved Road Operations

Since paved roads only contribute about three percent to the dust problem, there are few cost effective options to reduce this source of dust. Options discussed in the report include mileage/speed controls, wind breaks, street cleaning, water flushing, and control of mud/dirt carry out. Wind breaks are not a viable option.

Landfill/Grading/Construction Operations

Chemical and water treatments, paving temporary roads, and reducing disturbed acres were considered in the report. Water application can reduce dust during days when wind speed and direction cause problems, but the use of water for this purpose must be considered in light of water conservation needs. Reductions in the amount of soil required on solid waste may be illegal without special exemptions for alternative cover materials. Because landfill operations contribute less than one percent of the dust, solutions will have limited overall effect on the total dust problem.

Explosives

Explosives generate dust, however, since explosives are used well within the boundaries of the installation and the dust does not leave the installation, no alterations are recommended to training scenarios to reduce explosive generated dust.

Stationary/Portable Sources

The total contribution of dust from stationary/portable sources is less than one percent. Permits and rules already include most of these sources at the Combat Center. Replacing oil with natural gas, tuning heaters and boilers, and replacing internal combustion engines with electric-driven motors are discussed in the draft report as are emission controls on stationary equipment.

Specific objectives for the direct control of dust are not a responsibility of the Natural Resources Program. Thus, objectives for the direct reduction of dust are not presented here. However, the Mission Awareness program (Section 5.2.1) can provide Marines and other users of training lands recommendations for taking personal responsibility for dust reduction.

4.9 Training Land Management

The training land management project specifically does not include those aspects of training land management that are within responsibilities of the Facilities Management Division, Installations and Logistics Directorate or the Range/Training Areas Maintenance Section, Operations and Training Directorate (*e.g.*, fixed ranges, roads, signage, range police, targetry, range facilities).

4.9.1 Project - Training Land Monitoring

Project: Training Land Monitoring
Driver: Monitoring the capability of training lands to support the military mission (Sikes Act); Stewardship
Funding Priority: Class 1
Project Timing: Objective 1 - 2006; Objective 5 - 2004; Objectives 2-4 and 6-7 - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: External support and in-house
Success Monitoring: Completion of objectives

Goal. Provide land managers and trainers with long-term assessments of changes in the condition of training lands at the Combat Center.

4.9.1.1 Alternative 1 (Preferred)

4.9.1.1.1 Land Condition Trend Analysis

The development of the Multiple Land Use Management Plan (U.S. Marine Corps, 1996a) led to the implementation of a Land Condition Trend Analysis (LCTA) program to inventory the condition of training lands and establish a long-term monitoring program on the Combat Center. The below description of the LCTA program was summarized from discussions with Tierra Data Systems personnel and the final LCTA report.

Most LCTA monitoring plots were established in 1997 (76 plots) with some adjustments in 1998 as a result of training area realignment (16 plots) and a need for more habitat plots (5 plots). Two-thirds of plots were

established in areas exposed to various levels of military use (bajadas, playas, and desert pavement) and one-third in more inaccessible mountainous areas to be used as reference (control) plots in more unique habitats. Military use plots were grouped geographically to improve statistical reliability by minimizing local physical and biological influences. All plots were permanently installed (Tazik *et al.*, 1992) and located with global positioning systems.

LCTA plots were annually "read" in 1997-1999. The following parameters were measured in 1997 and 1999: soil surface stability (*i.e.*, rock cover, rock volume, shear strength, texture), sediment production and receipt, plant community dynamics (*i.e.*, plant cover and composition, shrub density), and markers of long-term nutrient cycling (*i.e.*, soil chemistry, texture, nitrogen input, microflora, plant tissue chemistry, rock volume). Disturbance was divided into classes depending on source (*i.e.*, vehicle, ordnance, or excavation) and age (*i.e.*, old, new, or uncertain). Parameters measured in 1998 were not as detailed as those in 1997 and 1999. Results of LCTA monitoring have been summarized into a report.

LCTA, as an efficient tool for monitoring land condition changes, is being overcome by technology advances. Its requirement for a large number of plots for statistical analysis and its lack of capability for interpolation over the Combat Center for site-specific decisions make it unwieldy or too expensive for most management purposes. Rapid advances in remote imagery (photography and sensing) show tremendous promise for management of a land base the size of the Combat Center.

However, LCTA has provided valuable insight into the Combat Center ecological relationships and military use impacts. LCTA provides a snapshot of land conditions at the Combat Center at one period in time. Since LCTA plots are permanent, this snapshot can be repeated using the same techniques as a long-term monitoring system.

Objective 1. Evaluate cost:benefits of repeating the LCTA program in 2009 (a 10-year interval) prior to the development of the next 5-year update of this INRMP.

Objective 2. Consider the use of LCTA technology for special, site-specific monitoring uses (*e.g.*, site restoration success, specialized habitat changes, vegetative community studies, site-specific military impact studies).

4.9.1.1.2 Land Use Condition Model

LCTA was intended to be used in conjunction with the Combat Center Land Use Compatibility Model to help analyze the effects of military use on the land resource. The Land Use Compatibility Model is a geographic information system-based tool for integrating military land use and natural resource information. This model includes a report with complete metadata on techniques. The model shows sites on the Combat Center where ground disturbances are significant (condition "red") and causes of these disturbances.

Objective 3. Evaluate the usefulness of the Land Use Compatibility Model and if justified, continue to update the model to meet program needs.

Objective 4. Evaluate the usefulness of the Land Use Compatibility Model methodology for determining military mission impacts.

4.9.1.1.3 Training Land Monitoring

During 2002-2006, as part of an evolving program, MAGTFTC will monitor the condition of training lands at the Combat Center, particularly those aspects of the land and its natural resources that are directly related to military training (*e.g.*, disturbance, concealment, soil capability to support maneuver, dust potential, safety hazards, fuel loads), emphasizing parameters that can be used for management purposes.

Experiences with LCTA indicate that MAGTFTC needs a monitoring system that provides information for site-specific decisions beyond those sites with monitoring plots. This implies a basewide system. Remote imagery can provide such coverage. Landsat imagery does not accurately portray vegetation in the Mojave Desert due to technology shortfalls involving the use of six, widely spaced bands.

At this point aerial photography has more value than other types of remote sensing for managing Mojave Desert ecosystems. Aerial photographs taken in 1952 and those taken in 1997 can be used as time markers to show cumulative impacts of land use at the Combat Center. However, as technology advances, other remote sensing tools may prove more cost and value effective.

Objective 5. Obtain aerial photographs in 2004 and analyze these for changes in disturbance compared to 1952 and 1997 aerial photograph analyses.

Objective 6. Incorporate training activity data (from Land Use Compatibility Model and Range Control) to link vegetation and disturbance change to known military impacts.

Objective 7. Explore new remote sensing technology for application at the Combat Center to improve the cost:benefits of monitoring training land condition.

4.9.1.2 Alternative 2 (No Action)

Alternative 2 would continue the development and use of LCTA. LCTA plots would be evaluated in 2001, and a complete evaluation of LCTA would occur in 2002 (E. Kellogg, personal communication, January 11, 2000). The usefulness of the Land Use Compatibility Model would be evaluated, the same as the Preferred Alternative. The use of remote sensing was not addressed in the Multiple Land Use Management Plan.

4.9.1.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

4.9.1.4 Other Options Eliminated

The Sikes Act requires no loss in the capability of the lands to support the military mission. This, in turn, implies a legal requirement to monitor effects of military activities. Thus, not monitoring is not a viable option. There are numerous other land condition monitoring programs used by other agencies, but they are not specifically designed to monitor effects of military activities on desert landscapes.

There is no requirement to develop a model for evaluating effects of military use at the Combat Center. Thus, this alternative could range from no model to using other parameters and modeling techniques to develop

alternative models.

4.9.2 Project - Training Land Management

Project: Training Land Management
Driver: Maintaining the capability of training lands to support the military mission (Sikes Act); Compliance with the Clean Air and Clean Water acts; Stewardship
Funding Priority: Class 1
Project Timing: Objectives 8 and 16 - by 2006; Other objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: External support and in-house
Success Monitoring: Completion of objectives

Goal 1. Coordinate with military training organizations to minimize disturbance to training lands and natural and cultural resources (*e.g.*, road proliferation prevention, protection of resources, dust control) and when justified and cost effective, restore training lands.

4.9.2.1 Alternative 1 (Preferred)

4.9.2.1.1 Training Disturbance Minimization

Virtually all land disturbance at the Combat Center comes from the military mission. Considering the huge costs and long time periods involved with restoration of disturbed training lands, minimization and management of disturbance is the most cost effective technique to manage natural resources at the Combat Center.

Rowlands (1980) summarized the need to prevent disturbance to desert ecosystems with the following blunt, decisive statements.

- No study or attempt at artificial rehabilitation and revegetation of desert disturbance has been an unqualified or even a qualified success, although a potential exists.
- It is questionable as to whether, without large inputs of time and effort put into breaking soil compaction and establishing a permanent irrigation network, the seeding or introduction of nursery grown transplants will substantially decrease the recovery time of a disturbed area.
- There is certainly no guarantee of success in any attempt to artificially rehabilitate desert vegetation in disturbed areas. Most efforts, even when backed by a large investment of funds and time, will be doomed to failure.
- A program of rest, recovery, and reuse, particularly with regard to areas of intensive off-road vehicle use, is wasteful and futile. Regardless of the level of effort regarding rehabilitation, recovery time is still measured in decades, and even then, reuse would return these areas to their previous condition within a few months.
- In desert habitats characterized by high levels of environmental stress, the effect of continuous and severe disturbance is to prevent a sufficiently rapid recovery or re-establishment of the vegetation.

Webb *et al.* (1986), studying compacted soil sites in ghost towns in the Mojave Desert, concluded, "Compaction appears to require approximately 100 years for recovery in the Mojave Desert...." They also

noted that freeze-thaw at higher elevations may be an important process in some soil conditions for recovery of compacted soils.

According to Lovich and Bainbridge (1999), the southern California desert ecosystem may require 50-300 years to naturally recover predisturbance plant cover and biomass, and complete ecosystem recovery may require over 3,000 years. They note that restorative intervention may enhance the success and rate of recovery, but costs are high, and the probability of long-term success is low to moderate. They conclude that the best management option is to limit the extent and intensity of impacts as much as possible.

Prevention and minimization of disturbance to training areas can help sustain the long-term military mission, but measures to accomplish these objectives must not significantly impair the ongoing military training mission. Protection of natural resources seldom requires total "off-limits" measures. For example, the option of foot-oriented training is almost always open in protected areas. In general, there are means to protect biodiversity and conserve natural resources that are very significant, yet impact relatively little on the overall military mission.

The following measures will be implemented to minimize further disturbance to Combat Center lands and their natural resources:

99. Units will be required to travel on existing MSRs unless training scenarios require off-road maneuver.
100. Tank traps and other digging will not be cut laterally across dry washes unless the natural flow of water in the wash is maintained or the area is returned to its natural state upon completion of training.
101. Off-road maneuver exercises will emphasize use of already disturbed sites, use of relatively undisturbed areas for off-road maneuver will occur only after the installation exceeds its capability to conduct the exercise in question using already significantly disturbed areas.
102. Certain areas may be off-limits due to special concerns. These may include cultural resources, endangered species, parts of playas, seeps and springs, high biodiversity value, etc. These could be described as mine fields, friendly forces, towns, etc. in training scenarios to add to the realism of off-limits areas.
103. Marines and other forces training at the Combat Center will be encouraged to avoid crushing vegetation during off-road maneuvers.
104. Marines and other forces training at the Combat Center will be encouraged to avoid neutral steer turns unless absolutely necessary and dry lake crossings will be managed as outlined in Wet Areas Management (Section 4.6).
105. Operations and Training Directorate will coordinate future target placement with NREA using the NEPA process or other means. Efforts will be made to ensure that sensitive natural and cultural resources areas are not impacted by the placement of targets and the subsequent firing concentration into target areas.
106. Communications wire will be removed by the training force as soon as possible after completion of training activities.
107. Lava tubes and mines are off-limits to military entry or use due to safety issues and the need to protect cultural resources.

Many of these disturbance minimization measures are included within proposed mitigation for the desert

tortoise (Section 4.5.4.3).

Objective 1. Implement above disturbance minimization measures.

Objective 2. Emphasize disturbance minimization in programs described in Mission Awareness (Section 5.2.1).

4.9.2.1.2 Military Training Distribution

MAGTFTC will identify intensively used training areas. Training planners will then be expected to continue to use these areas to the maximum extent possible, especially for off-road maneuver. This should be a popular tactic since these areas are obviously already preferred as evidenced by the disturbance done there.

The other way to distribute training into already degraded lands is to plan new range projects to use these areas. This objective will be implemented by master planners at MAGTFTC. NEPA documentation associated with new projects will emphasize the use of already disturbed lands as alternatives to be strongly considered. See NEPA (Section 5.5) for more information.

Objective 3. Whenever possible in context of military mission accomplishment, concentrate potentially disturbing military activities onto lands already severely degraded.

Objective 4. Whenever feasible, use disturbed lands for range facility development.

4.9.2.1.3 Concentrated Military Use Site Management

Predesignated Range Training Support Sites are identified and briefly described in Section 3.6.5. They are particularly important in minimizing disturbance to training areas from concentrated training support activities. The general process used in selecting such sites is described in Templeton (1997). Predesignated Range Training Support Sites are assigned to units by Range Control (CCO 5090.1B). Other concentrated use sites include fixed firing ranges, staging areas, and similar locations where Marines concentrate their training activities.

These sites should be maintained to ensure their value for training and minimize disturbance to surrounding areas. The following techniques are pertinent to concentrated military use site management.

- Ensuring proper drainage could include reshaping disturbed natural drainages or even creating new drainage channels to return water to natural channels downstream from sites.
- Quality roads to these sites can be constructed, or if multiple roads exist, one can be upgraded and others closed. Often these sites are so popular that networks of roads lead to and from them. It may be advisable to block unneeded access roads to such sites. This tactic is critical to sites on top of hills and mountains. Roads up steep grades are very damaging and difficult to repair.

Objective 5. Coordinate with the Range/Training Area Maintenance Section to provide technical assistance toward the maintenance of Predesignated Range Training Support Sites and other areas of concentrated military use.

Objective 6. Jointly (Operations and Training and NREA) identify areas where additional Predesignated Range Training Support Sites are required. Design (Installations and Logistics using NREA support) improvements and program them for implementation.

4.9.2.1.4 Roads and Access

A major portion of land maintenance involves the construction and maintenance of access roads where they are justified. Many roads were laid out with little regard to location, long-term stability, or erosion control techniques. Others were created as units conducted training exercises. Once a trail is created, it tends to be used by those who follow later. This scenario eventually leads to a random network of roads and trails, often in highly undesirable locations. This can cause serious land disturbance and a reduction of quality training areas.

Training at the Combat Center requires the use of roads other than MSRs at times. The use of upgraded MSRs must be tailored to support the training scenario. However, this does not mean that road upgrades are not useful and cannot be integrated with training scenarios. In fact, high quality roads are often used as main corridors of travel in actual combat zones.

Places where road upgrades can be most beneficial are those where traffic must funnel through narrow areas, such as passes or exits from Mainside, particularly to the east. Road upgrades would also be particularly useful where military traffic is routed around important protected sites, such as at Foxtrot Petroglyph Site.

Road maintenance at the Combat Center must be particularly cautious of creating berms along road shoulders. Road berms can channelize water and create rutting, and steep berms can create physical barriers to desert tortoise movement or cause them to tip over when attempting to climb.

Maintenance to roads and heavily used areas (sections 4.9.2.1.2 and 4.9.2.1.3) allows these areas to be repeatedly used, which reduces disturbance elsewhere. To further the MAGTFTC goal of meeting its training mission while maintaining functioning native habitats, it encourages or focuses training activities in areas that have supported extensive training in the past.

Objective 7. Work with Operations and Training and FMD to identify places where road upgrades or relocations can benefit both troop travel and natural resources conservation. Once located, work with Installations and Logistics to design projects to enhance these roads, encourage their use, and avoid significant impacts to the desert tortoise. This will include proper drainage work on the shoulders and good dry wash crossings.

Objective 8. Collect or use existing soil permeability data and contour delineation to evaluate the possibility that flash flood risks to roads may be increasing due to vegetation loss and soil compaction.

4.9.2.1.5 Training Land Restoration

Training land restoration seeks to stabilize soils and provide long-term vegetative cover for military and other purposes. As noted in Section 4.9.2.1.1, restoration activities are expensive and often have limited success. Restoration at the Combat Center will be targeted to specific small-scale project where the need is such that high risk, expensive restoration projects are justified.

Lessons Learned

Edwards and Zink (1997) reported on the use of various plant community restoration experiments at a 1,600-meter tank trail site and the former Vertical Short Takeoff and Landing site on the Combat Center. The study used native species and included the following general techniques:

- exotic versus native species germination;
- mechanical pitting versus imprinting;
- construction of tactical concealment mesquite mounds;
- use of bark mulch;
- seeding versus container planting;
- comparison of 1) flood irrigation into a watering basin, 2) flood irrigation into a punched straw mulch-lined watering basin, and 3) diffusion irrigation using porous ceramic capsules; and
- use of artificial irrigation.

Results included the following:

- during scant winter precipitation, nonnative species had much greater natural seed germination than native species, but there was no significant difference in germination in native and exotic species on seeded experimental plots;
- bark mulch did not improve germination, and this treatment results in the entrapment of windblown sand, possibly burying seed too deep for germination;
- ripping, preferably combined with imprinting, increased survivorship of plants compared with unripped areas;
- survival of mesquite seedlings on ripped mounds was 1% compared to 33% on unripped mounds, but this may have been affected by different soils for these treatments;
- Driwater® is subject to loss by coyotes and rabbits, but it may increase survival of plants, particularly for fall plantings just prior to winter rains;
- straw mulch-lined watering basins had no known value on mounds, and survivorship may be lower where it is used compared to unlined basins; and
- ceramic capsule-treated plantings had intermediate survival between straw lined watering basins and plain watering basins.

A major conclusion was that natural irrigation (good precipitation) will always produce the best results, but it is infrequent and difficult to predict when planning restoration projects. During most years supplemental irrigation will be needed to ensure plant survival.

Edwards and Zink (1997) also surveyed for endemic mycorrhizal fungal species at the tank trail site compared to an adjacent reference area. They found no arbuscular mycorrhizal spores on the tank trail or mesquite mounds and potentially five different species in the reference area. These symbiotic fungi inhabit plant roots and the spaces between soil particles, and they can improve nutrient and water uptake in exchange for sugars produced by plants.

The study also involved a nitrogen deposition experiment at the former Vertical Short Takeoff and Landing

site. It is believed that heavy nitrogen deposition is aiding the spread of exotic annuals at the expense of native perennial shrubs. This, in turn, could lead to an increase in the threat of wildfire.

Potential Restoration Techniques

Revegetation projects involve modification of surface topography to decrease surface compaction and increase the amount of natural precipitation captured at the site. Ripping, pitting, swaling, and creation of small catchment basins are examples of surface management techniques. The greatest challenge to the success of revegetation projects is providing adequate supplemental water to ensure seedling establishment.

Problems associated with water erosion, such as gullies and sedimentation, can generally be traced to upslope areas that have sustained vegetation loss. Vegetative cover protects the soil surface from the impact of precipitation, increases infiltration to decrease runoff, slows downslope flows, and stabilizes the soil within the rooting zone. Re-establishing native vegetation is an objective of erosion control projects. Mechanical means of reducing runoff and decreasing flow rates may be necessary at sites where substantial gullies have already formed. Modification of the surface topography by pitting on moderate slopes or creating catchment basins allows more water to be captured on site. Barriers to downslope movement (*e.g.*, bamboo fences, rocks, erosion control fabrics, straw wattles) can inhibit sheet flows. Check dams, composed of various materials placed at intervals along gullies, increase the amount of soil retained.

Objective 9. Evaluate land restoration projects on a case-by-case basis, emphasizing its use when long-term environmental and/or military training benefits are greater than costs and risks.

Objective 10. Emphasize native species during land restoration and specifically target the replacement of exotic invasive species, consistent with Executive Order 13112, *Invasive Species* (see Section 4.11.1.2).

Objective 11. Use experience gained from previous restoration and research projects (both on- and off-the Combat Center) to improve the design and implementation of future restoration projects.

4.9.2.1.6 Uniform Marking

The Combat Center needs a uniform system of marking Special Use Areas to prevent further disturbance to sensitive areas and avoid injury to military personnel. A uniform marking system can be used to mark Main Supply Routes, playa crossings, hazardous areas, right-of-way boundaries, springs, etc. Information concerning a uniform marking system will be incorporated into mission awareness training (Section 5.2.1).

Objective 12. Use and maintain a uniform marking system to support requirements of military training; remove obsolete siber stakes.

4.9.2.1.7 Access Across BLM Lands

There are several commonly used, or desired, access routes that involve military units crossing Bureau of Land Management lands to the Combat Center training lands. These include:

- through the mountains just to the south of Cleghorn Pass-Bullion training areas, a route recognized by the Desert Protection Act of 1994;

- to America Mine Training Area from the east;
- to the northern portion of Maumee Mine Training Area northwest of the Combat Center;
- to Lavic Lake Training Area from the north; and
- to Lead Mountain Training Area from the north.

Objective 13. Continue to obtain approval for military access across BLM lands and apply for formal rights-of-way within defined limits from the BLM. NEPA will be required for these actions.

4.9.2.1.8 Soils Inventory and Monitoring

MAGTFTC just completed an installation-wide soils inventory (Lato *et al.*, 1999). No additional general soils surveys are required during the next five-year period.

Below objectives are general to most projects described in Chapter 4 of this plan, and they do not require funding beyond what is in these other projects. Thus, a specific project for the use of soil information for project decisions is not required.

Goal. Use soil parameters to manage military activities, protect soil stability, restore training lands, and conserve wildlife habitat.

Objective 14. Use site-specific soil testing for natural resources programs, such as training land rehabilitation and erosion control.

Objective 15. Use soil inventory data to make decisions regarding land use and wildlife habitat management options.

Objective 16. Continue to develop and refine a monitoring system for determining on-base wind erosion impacts.

4.9.2.2 Alternative 2 (No Action)

The Multiple Land Use Management Plan described programs to minimize disturbance and restore already disturbed lands. Programs described were similar to the Preferred Alternative, but there was more emphasis on land restoration. Lessons learned from implementation of these restoration programs, both at the Combat Center and elsewhere, have led to a change in emphasis from restoration to prevention. Observations and data collection of natural vegetation restoration during high rainfall years have also influenced decisions to rely more on natural land restoration when conditions permit it to function more efficiently. The BLM access objective is similar to the Preferred Alternative. Alternative 2 is the same as the Preferred Alternative with regard to soils inventory and monitoring.

4.9.2.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would include two projects to restore the former VSTOL site. The first would remove the fence, berm, and "moat" at the site, and the land within those barriers would be returned to habitat for the desert tortoise and other species. The second project would complete the ripping and revegetation of the former runway at the site.

4.9.2.4 Other Options Eliminated

The minimization and restoration of disturbance to training lands is not required with exception of those items specifically included as mitigation for the desert tortoise (Section 4.5.4.3.1). Thus, at least in theory, implementation of much of the Training Lands Management Project could be eliminated or scaled down to any level.

However, significant cutbacks could lead to conflicts with other programs that are legally mandated. For example, if a uniform marking system was not used, there could be conflicts between the military mission and the protection of sensitive species and cultural resources, many that are legally protected. The same would be true if cutbacks in Training Lands Management were to increase erosion threats to cultural resources. Thus, significant reductions in the Training Lands Management program could result in the requirement to increase the scope of other natural or cultural resources programs. However, since other options for repairing military disturbed lands were not specifically designed for this purpose, it would be difficult to find substitute programs that are as effective or efficient as the Training Lands Management program.

The 1997 amendments to the Sikes Act added the requirement for no net loss in the capability of the land to support the military mission of military installations. Thus, even though this law does not specify the implementation of Training Lands Management, it does require similar programs if the land is being degraded in terms of its capability to support military operations.

Additional general soil surveys are not a viable option due to the high quality, current soils survey for the installation. Not using data from this inventory is an option, but not one that is prudent in terms of compliance and stewardship.

4.10 Project - Mainside Grounds Management Support

Project: Grounds Management Support
Driver: Compliance with Executive Order 13112, *Invasive Species*; Compliance with Presidential directive; Water conservation; Stewardship
Funding Priority: Class 3
Project Timing: Objectives 1 and 2 - by 2006; Other objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: In-house
Success Monitoring: Completion of objectives

Goal. Provide support to maintain an aesthetically pleasing Mainside landscape that maintains natural ecosystem functions as much as possible.

4.10.1 Alternative 1 (Preferred)

At the Combat Center, approximately 929 square miles are unimproved grounds; most are available for live fire and maneuver exercises. Improved and/or landscaped areas are restricted to Mainside, which occupies approximately six square miles. The developed landscape consists of a variety of trees, shrubs, and ground

covers that require routine maintenance efforts, such as mowing, edging, weeding, fertilizing, insect or pest control, pruning, the replacement of dead plant material, and irrigation.

The nature of the desert precludes many options available at other locations with regard to urban area landscaping. Grounds are maintained by Installations and Logistics Directorate, military units, and housing residents. There is no formal grounds maintenance Standing Operations Procedures, nor is one needed. The improved grounds acreage is very small compared to installation size. The normal definition of semi-improved grounds does not apply at the Combat Center since it is based on mowing cycles.

Emphasis on native species urban landscaping in the 1990s opened a new avenue for natural resources management. Prior to this, the Combat Center Mainside management program consisted primarily of landscaping with exotic species, irrigation, and closely mowed lawns, generally associated with housing, recreation fields, golf courses, and military parade areas. This emphasis is steadily moving toward xeriscaping and the use of native species.

Landscaping

A 1994 Presidential memorandum to the Heads of Executive Departments and Agencies (Office of the President, 1994) on the topic of landscaped grounds promoted environmentally and economically beneficial grounds maintenance. Native desert species landscaping can save millions of gallons of water annually at the Combat Center.

San Diego State University developed a list of native species that is recommended for the Combat Center landscaping. This list includes desert ironwood (*Olneya tesota*), desert willow (*Chilopsis linearis*), ocotillo (*Fouquieria splendens*), catclaw acacia or devil's claw (*Acacia greggii*), and blue palo verde (*Cercidium floridum*). There is also a list of desert plants for landscaping in the Base Exterior Architecture Plan.

Joshua Tree National Park has the capability to grow native species for transplanting to the Combat Center. Problems with this option are costs of growing and transplanting, but the plants would be well adapted to the Combat Center area. The other option is transplanting directly from the Combat Center. If suitable stock is available without threatening plant communities, transplanting from Combat Center stocks will be used. Care will be taken to use only a few plants from any given area in relation to the overall density of the species.

In recent years significant xeriscaping projects using native species at Mainside include:

- the Main Gate area,
- NREA building,
- Naval Hospital, and
- the stormwater retention pond.

One particular exotic species will no longer be used for landscaping at the Combat Center. Fountain grass (*Pennisetum setaceum*) has shown itself to be very aggressive in the Palm Springs area (University of California, Riverside, 1993). This move is consistent with Executive Order 13112, *Invasive Species*.

New construction plans include landscaping, dust control, and drainage features. These are important to long range maintenance of Mainside facilities. However, some of these get cut due to funding cutbacks, leaving

projects with drainage and erosion problems.

Irrigation

There are opportunities to conserve water being used for irrigation at the Combat Center. However, non-potable water cannot be used on residential lawns or playgrounds because its quality is too low for direct human contact. The caliche sublayer just beneath the surface is relatively impermeable, and water used for irrigation often bubbles back to the surface.

There is an increasing use of treated wastewater for irrigation of areas where direct skin contact is unlikely. The golf course is the largest such user of this type of water, and treated wastewater is also used for windbreaks, the parade field, and some athletic fields. MAGTFTC is continuing development of a nonpotable water distribution system.

MAGTFTC is developing a Groundwater Resources Management Plan (Section 3.6.3). This plan will address the base's water needs and options for the next 20-30 years. It will include ways to minimize water use. Xeric landscaping and irrigation reduction will be a part of this plan.

Objective 1. Develop a native plants landscaping plan and consolidate the San Diego State University and Base Exterior Architecture Plan approved plant lists into an updated Base Exterior Architecture Plan.

Objective 2. Incorporate the Base Exterior Architecture Plan into the Comprehensive Development Plan to guide the use of native plants for landscaping.

Objective 3. Comply with ecosystem management concepts, the Presidential directive, Executive Order 13112, and future mandates with regard to Mainside grounds maintenance.

Objective 4. Provide professional advice to guide the grounds landscaping and maintenance program toward the use of native species and drought-tolerant species.

Objective 5. Continue to improve water conservation using improved techniques and reduced requirements for Mainside irrigation.

Objective 6. Continue to emphasize that construction funding includes long-term landscaping programs.

4.10.2 Alternative 2 (No Action)

Alternative 2 would be similar to the Preferred Alternative with exception of the emphasis on avoiding invasive species.

4.10.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

4.10.4 Other Options Eliminated

There are no legal requirements to manage improved grounds to the extent that is done at the Combat Center. However, there are requirements (*e.g.*, Office of the President, 1994; Executive Order 13112; MCO P5090.2A) to use native species and reduce water usage for plantings. Thus, the grounds maintenance program could be scaled back, but not eliminated. On the other hand, it could be significantly increased, particularly if increases involved xeriscaping. However, considering budget cutbacks, grounds maintenance programs are not likely to be significantly enhanced in the near future.

4.11 Project - Pest Management

Project: Pest Management Support
Driver: Compliance with Executive Order 13112, *Invasive Species*; Compliance with Presidential directive; Compliance with the Endangered Species Act; Stewardship
Funding Priority: Class 1
Project Timing: Objective 5 - by 2002; Other objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: In-house and contract
Success Monitoring: Completion of objectives

Goal. Control those plant and animal species that affect natural resources management (*e.g.*, reduce ecosystem functionality, displace native species) or directly affect the military mission on the Combat Center.

4.11.1 Alternative 1 (Preferred)

Pest management programs are accomplished under a Pest Management Coordinator with assistance of other activities on the Combat Center. The *Pest Management Plan* (Naval Facilities Engineering, 1999), upon which much of the below discussion is based, is used to implement pest management activities at the Combat Center.

The purpose of *Pest Management Plan* is as follows:

- to support the military mission by protecting the health and welfare of military and dependent personnel,
- to maximize the service life of structures and other types of real property,
- to reduce reliance on pesticides to solve pest problems, and
- to implement environmental protection measures at every opportunity.

The plan identifies pest problems, outlines surveillance strategies for the control of pests, and describes statutory, administrative, safety, and environmental requirements of the program. The plan implements a uniform DoD-wide record-keeping and reporting system. The plan emphasizes Integrated Pest Management and applies to all pesticide use on the Combat Center by in-house forces or commercial services except pesticide repellents used for personal relief.

NREA responsibilities listed within the *Pest Management Plan* are:

- provide information on protected species, endangered or threatened species, noxious or invasive species, and environmentally sensitive sites;
- provide guidance on the management of nuisance wildlife;
- perform internal, environmental compliance evaluations; and
- support the Pest Management Coordinator in implementing strategies and procurement of pollution abatement equipment to meet pesticide reduction goals.

Integrated Pest Management is a strategy to pest management/prevention that includes chemical, physical, and biological suppression techniques considering pest biology and behavior and environmental factors. Integrated Pest Management programs emphasize prevention in lieu of corrective measures when cost effective and uses surveys to determine the identity and location of pests, use of non-chemical control techniques, and the careful use of pesticides. Integrated Pest Management is based on the principal that control is only required if a population will surpass an economic or aesthetic injury threshold. The presence of a pest does not warrant immediate control efforts unless the pest population will:

- adversely impact the military mission or cause economic loss,
- endanger health or welfare or impact Marine Corps morale, or
- become so dense that it can no longer be tolerated.

The MAGTF-TC pest management program is consistent with a Presidential directive (Office of the President, 1994) to reduce pesticide use by using Integrated Pest Management.

The *Pest Management Plan* discusses many aspects of pest management that are not directly within the scope of this INRMP, such as control of disease vectors and protection of facilities. Below discussions of animal and plant control are specific to the management of natural resources on the Combat Center.

Objective 1. Support implementation of the Pest Management Plan (Naval Facilities Engineering, 1999).

4.11.1.1 Animal Control

Some animal species are widely considered to be pests when they are, in fact, a critical part of the environment. Snakes, rattlesnakes in particular, are not considered pest species at the Combat Center. If snakes are found in buildings or developed areas, they are removed, not killed. Snakes control rodents, that can carry hantavirus, plague, and other diseases communicable to humans.

With the exception of the European Starling, English Sparrow, and Rock Dove (Pigeon); household invertebrates; household rodents; and Africanized or European honeybees, all species of wildlife are protected, unless specifically targeted for control. Coyotes are only to be considered pests under very specific circumstances, such as animals habituated to human presence. In the Combat Center training areas, only feral or free-roaming dogs are considered pests.

San Bernardino County, where MCAGCC is located, is considered infested with ***Africanized honey bees***, that were found in the town of Joshua Tree, a few miles west of Twentynine Palms in 1998 and in Twentynine Palms in July 2000. Recent reports indicate that these invasive bees are adapting well to the desert environment and are also becoming more cold tolerant. This species is more aggressive than the European honey bee, commonly cultured for honey production.

The spread of non-native ***fire ants*** *(Solenopsis invicta)* is also a major concern. Fire ants are slowly spreading northward from southern California. Their nests can be identified by mounds of excavated sand harboring thousands of aggressive ants that both bite and sting, leaving painful, infected pustules.

The ***raven*** (*Corvus corax*) population has increased greatly due to the increased human presence in the Mojave Desert (University of California, Riverside, 1993). The greatest concern with ravens is their reputation for predation on young desert tortoises. Raven reduction is a frequently listed strategy for management of this federally-listed, threatened species. Juvenile tortoise parts were frequently collected from raven nesting and perching sites close to the Combat Center landfill (Krzysik and Trumbull, 1996). Both the University of California, Riverside (1993) and Krzysik and Trumbull (1996) recommended raven control.

The Combat Center buries its refuse daily at the landfill which helps control raven scavenging (and possibly the raven population). A pilot program to poison and shoot ravens at the landfill in 1989 was effective during a short period. More than 100 birds were killed. However, the raven population had returned to normal 82 days after the killing ceased (Krzysik and Trumbull, 1996). Control measures will be coordinated with the USFWS, in compliance with the Migratory Bird Treaty Act, and NEPA documentation will be prepared for the proposed action.

Krzysik and Trumbull (1996) presented a list of actions that MAGTFTC could take to reduce raven numbers. They noted that negative effects of implementing raven control outweighed positive effects, especially since responses are short-term, often costly, and politically sensitive. Experience has shown that, of these actions, only the following are viable:

1. Control Food Resources:
   a. Cover landfill garbage several times daily.
   b. A coyote-proof fence was installed around the entire landfill to prevent coyotes from digging up food that ravens can use.
   c. Cover trash cans in housing areas.
2. Educate the Combat Center Residents:
   a. Make residents aware of raven problems so they can help solve the problem.
   b. Use posters and educational flyers.

Krzysik and Trumbull (1996) considered the ***coyote*** as a pest species that should be controlled using lethal or nonlethal techniques. However, more current strategies do not classify coyotes as pests, except when they directly impact humans in urban areas.

Section 4.5.4 discusses effects of predation on desert tortoises and recognizes impacts by ravens, coyotes, and feral dogs. Tortoise researchers have observed tortoise harassment by dogs. However, only ***feral and free-roaming dog*** control is a specific, predator-removal action to minimize impacts of predation on the desert tortoise at the Combat Center.

The fact that dogs, ravens, coyotes, foxes, hawks, eagles, and other species sometimes kill tortoises, especially young tortoises, does not automatically require predator control actions. It is a question of significance as well as effects on overall ecosystem functionality. Ecosystem management does not preclude the use of predator control; however, it does require thinking beyond just one species, even a threatened or endangered species.

Objective 2. Provide response to Mainside requirements for animal pest control.

Objective 3. Provide technical support to implement sanitation procedures to reduce the attractiveness of Mainside, particularly the landfill, to ravens, coyotes, and other species.

Objective 4. Continue to educate Marines and other personnel about the importance of proper disposal of unused food items and other refuse.

Objective 5. Use the Endangered Species Recovery Council (via Southwest Division) to evaluate means to control feral and stray dogs, particularly in high density tortoise areas.

Objective 6. Support the control of Africanized bees and fire ants whenever and wherever they are discovered on the Combat Center.

4.11.1.2 Plant Control

The removal of saltcedar (tamarisk) from Mainside, Emerson Lake, Deadman Lake/Sand Hill, Lavic Lake, Lead Mountain, and America Mine is an ongoing land restoration action. These trees have limited wildlife value, displace native species, and dominate local water supplies. Approximately 2,100 adults, 2,200 seedlings, and 50 previously treated, resprouting individual trees were treated in late 1998 with Pathfinder® herbicide (Giessow *et al.*, 1999) and more than 12,000 plants were treated in December 2000.

The invasive *Tamarix ramossisima* and *T. chinensis* are being specifically targeted for removal. These species are found in relatively few locations on the Combat Center, and complete removal is possible. *T. aphylla* is a significant user of water and is primarily found at Mainside; it is not as invasive and is not a priority for removal at this time.

Russian thistle (*Salsola* spp.) is another invasive plant species that is being targeted for removal in major areas of infestation (*e.g.*, Acorn, Sand Hill, and Emerson Lake training areas). Complete eradication does not appear to be a reasonable goal for Russian thistle at this time, but control should slow or reverse this invasive species.

Nonnative grasses are invasive and may create wildfire risks to ecosystem functionality on many areas of the Combat Center. These grasses are not being controlled at this time on the Combat Center. This issue is discussed in Section 4.12, *Fire Management*.

Objective 7. Remove invasive saltcedar with a goal of eradication and maintenance of that status.

Objective 8. Control Russian thistle in major areas of infestation.

4.11.1.3 Measures of Merit

In 1994 the Department of Defense issued the following three Measures of Merit that defined the course of installation pest management programs:

- Have a current pest management plan.
- Reduce pesticide use by 50% over a seven-year period (1994-2000).
- Have pesticide applicators certified within two years of employment.

The MAGTFTC Pest Management Plan is current. All chemicals used on the Combat Center are EPA-approved.

Integrated pest management techniques, particularly the concrete-lining of drainage channels that reduced the need for mosquito control, have enabled the installation to reduce its use of pesticides by over 50% compared to the base year. The installation understands both obvious and long term threats to both humans and ecosystem functions from pesticides. Pesticide applicators meet certification requirements.

Objective 9. Maintain an updated Pest Management Plan on a five-year cycle.

Objective 10. Emphasize integrated pest management techniques to continue to reduce the use of pesticides.

Objective 11. Ensure pesticide applicators are fully certified.

4.11.2 Alternative 2 (No Action)

The Multiple Land Use Management Plan had considerable emphasis on the control of ravens, coyotes, and other tortoise predators. However, such control was not to be implemented until an endangered species management plan was finalized. Since this INRMP is that endangered species management plan, Alternative 2 would be identical to the Preferred Alternative in terms of those species. The Africanized bee issue was not known at the Combat Center when Alternative 2 was developed. The measures of merit were the same.

4.11.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

4.11.4 Other Options Eliminated

MAGTFTC could directly control tortoise predators to any degree that could be funded, in spite of issues related to the killing of these predators, particularly native predators and the ultimate value of that control. The control or elimination of invasive, non-native plants could be adjusted, but only if restricted by budgetary considerations (Executive Order 13112, *Invasive Species*). A non-control strategy would not comply with this Executive Order.

Extensive control of invasive, exotic plant species throughout the Combat Center (*e.g.*, tamarisk, nonnative grasses) is an option that has potential to be more beneficial than the Preferred Alternative in terms of ecosystem value. However, the creation of such a program would require a significantly increased budget, and the potential for long-term success without significant ecosystem degradation (*e.g.*, increased use of herbicides, negative effects on non-target species) is low.

The Department of Defense and U.S. Marine Corps are committed to achieving and maintaining compliance with the three measures of merit. MAGTFTC is thus committed to these same goals. There are no alternatives to achieving an updated pest management plan or requiring applicators to meet certification requirements.

Other pest management programs are either not an integral part of natural resources management (and thus not covered by this analysis), are required by human health regulations, or are optional (to either a lesser or greater degree of implementation) as they are quality of life-related programs.

4.12 Project - Wildfire Management

Project: Wildfire Management
Driver: Compliance with Executive Order 13112, *Invasive Species*; Compliance with Endangered Species Act; Compliance with Sikes Act (capability of lands to support military mission); Stewardship
Funding Priority: Class 2
Project Timing: Objective 4 - by 2002; Objective 5 - by 2006; Other objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: U.S. Fish and Wildlife Service (desert tortoise implications only)
Vehicle for Project Implementation: In-house and other agencies
Success Monitoring: Completion of objectives

Goal. Prevent and suppress wildfires to maintain ecosystem biodiversity and functionality.

4.12.1 Alternative 1 (Preferred)

Most of the Mojave Desert ecosystem evolved in the absence of significant wildfires. Under natural conditions, wide plant spacing and the scarcity of native grasses are natural barriers to the spread of fire.

Since the 1970s, nonnative, annual grasses in the genera *Bromus* and *Schismus* have become increasingly dominant in the Mojave Desert. Unlike most native plants, that specialize in particular microhabitats, these grasses grow in many different situations and can create continuous fuel beds across the landscape. Unlike native annuals, that crumble and blow away soon after they die, dried remains of these nonnative grasses stay rooted in highly flammable, dense stands for years. Adding significantly to the issue is increasing human use of the Mojave Desert, which increases opportunities for fires to start. Compounding the issue is that once occurring, fires further encourage the spread of nonnative, annual grasses, further increasing fire risks in terms of fire intensity and frequency (Brooks, 1999; U.S. Geological Survey, 1999).

Wildfires have thus recently become a major threat to Mojave Desert ecosystem functionality and biodiversity, including listed and/or otherwise sensitive plant and animal species. The Combat Center has only recently experienced significant increases in these nonnative, annual grasses. Since they appear to be benefitted by disturbance, the Combat Center can expect this problem to increase in the future. The military use of pyrotechnics increases the probability of wildfires starting in some areas of the Combat Center where non-native annual grasses and shrubs proliferate.

The issue of wildfire control has legal implications involving federally-listed species, such as the desert tortoise[7] (Duck *et al.*, 1997). Wildfire prevention (*e.g.*, firebreak construction and maintenance) and its suppression (*e.g.*, equipment and personnel moving across open desert, firebreak construction, backburning operations) involve "take" risks. In addition, wildfire suppression creates other negative impacts on ecosystem functionality, such as soil compaction, vegetation destruction, and the creation of trails that can lead to increased, long-term human impacts.

MAGTFTC is developing a wildfire management plan (Appendix 4.12). The plan is rudimentary, but it is an

[7] Duck, T., T. Esque, and T. Hughes. *Fighting Wildfire in Desert Tortoise Habitat: Considerations for Land Managers*. Presentation for BLM firefighters.

important step in responding to a potentially increasing risk to the Combat Center ecosystem and perhaps its value for military training.

Objective 1. Develop and implement the wildfire management plan for the Combat Center as fire risks, prevention/ suppression, and post burn treatment options are better identified.

Objective 2. Require all military units and other installation personnel to report wildfires as soon as possible.

Objective 3. Respond to wildfires as soon as possible and begin immediate suppression, consistent with safety related to unexploded ordnance.

Objective 4. Incorporate burn areas as a GIS data layer for fire effects monitoring.

Objective 5. Develop means to include wildfire risk assessments in installation monitoring programs.

Objective 6. Evaluate methods for treatment of burned areas to reduce invasion by exotic species.

Objective 7. Use the mission awareness project (Section 5.1.2) to emphasize wildfire prevention and reporting.

4.12.2 Alternative 2 (No Action)

Fire management would not be a part of Alternative 2 as fire risks were considered minimal when the Multiple Land Use Management Plan was developed.

4.12.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

4.12.4 Other Options Eliminated

MAGTFTC is committed to developing a wildfire prevention/suppression program that supports the military mission and protects ecosystem functionality. It is primarily achieving this objective using information gained by other land management agencies in the Mojave Desert.

4.13 Project - Special Interest Area Protection

Project: Special Interest Area Protection
Driver: Stewardship
Funding Priority: Class 3
Project Timing: All objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: In-house
Success Monitoring: Completion of objectives

Goal. Provide protection for areas of special ecological concern.

4.13.1 Alternative 1 (Preferred)

Designation of special protection status for unique or fragile areas is an important management tool. It is more cost effective to put use restrictions on some areas to minimize disturbance than to mitigate disturbance. The protection of special cultural resources interest areas is not included in this section.

4.13.1.1 General Provisions

As part of project review and the NEPA process, NREA reviews proposed projects and activities at the Combat Center. Natural resources managers can identify concerns and recommend measures to minimize disturbance. Wet areas are special interest areas, but programs for their protection are outlined in Section 4.6, so they are not included within this section. The same is true with desert tortoise study areas and the Special Use Area (discussed in Section 4.5.4), but other special interest areas also support tortoises.

Objective 1. Use project review and the NEPA process to protect special interest areas.

Objective 2. Use GIS to identify areas of special interest to natural resources managers, project planners, military planners, and personnel using the Combat Center.

4.13.1.2 Special Interest Areas

Flood Plains

The 100-year flood plains have been delineated for Deadman and Mesquite lakes (U.S. Army Corps of Engineers, Unknown (a); Unknown (b)). These flood plains are of special interest as they are subject to development and the impacts of adjacent development.

Objective 3. If development is required in or immediately adjacent to flood plains, use the NEPA process to minimize or mitigate adverse impacts.

Lava Tubes and Mines

The water in lava tubes and mines provides a valuable habitat component for species that may be sensitive or State-listed but are not federally-listed. These areas are off-limits to entry, including military activities. Gates have been placed across entrances to Benchmark 19, Pat Malloy (1 gate), and Imperial Lode (2 gates) mines. These gates have access holes for bats and other wildlife that may use them. Both Pat Malloy and Imperial Lode are eligible for listing on the National Register of Historic Places as parts of Lava Beds Mining District.

Objective 4. Continue to protect lava tubes and mines, consistent with requirements of the military mission.

4.13.2 Alternative 2 (No Action)

Actions within Alternative 2 are similar to the Preferred Alternative except that actions prescribed in the Multiple Land Use Management Plan are generally completed with continuation of protection the remaining requirement.

4.13.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

4.13.4 Other Options Eliminated

Programs to protect flood plains are driven by direct or indirect regulatory requirements. There are no options to the use of NEPA to identify threats to these areas. The protection of eligible mines is mandated by the National Historic Preservation Act and Archeological Resources Protection Act.

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5.0 NATURAL RESOURCES-RELATED PROGRAMS

This chapter includes those programs that are directly related to natural resources management, but are not being implemented solely for that purpose. Some, such as enforcement and outdoor recreation, are totally or partially within responsibilities of organizations other than NREA. These programs do not have specific projects identified as they are not funded through NREA.

Projects identified in this section are intended to be Environmental Program Requirements submissions to integrate implementation of this INRMP to the budget process (see Section 7.5). Each project has a goal(s). Project format is as follows:

Project: Title
Drivers: Needs to be satisfied in order for the mission to continue without disruption (see Section 1.2.2)
Funding Priority: Proposed or actual budget classification
Project Timing: Dates to be accomplished, by objective (*e.g.*, 2002, 2002-04, indefinitely, uncertain)
Regulatory Approvals: Agencies with whom coordination is required
Vehicle for Project Implementation: Who will accomplish the project
Success Monitoring: How project success will be monitored

Following each project will be **Alternative 1 (Preferred)** which uses an objective(s) format to provide process descriptions that are compatible with adaptive management analyses and overall INRMP implementation monitoring processes. All goals and objectives are summarized in tabular format in Appendix 7.4.

Following each description of the Preferred Alternative will be brief descriptions of **Alternative 2 (No Action)** and **Alternative 3 (Enhanced Stewardship)** (see Section 1.7.4). Finally, brief descriptions of management options that were eliminated **(Other Options Eliminated)** are presented.

5.1 Natural Resources Enforcement

MAGTFTC has no hunting and fishing programs that would typically require enforcement. With the possible exception of a small population of bighorn sheep, there are no game animals on the Combat Center that would attract the attention of poachers. Thus, control of legal and illegal hunting and fishing is not a significant requirement.

The Combat Center allows no public access and strictly controls personnel access to range areas. This control reduces the need for enforcement of natural resources protection. At MAGTFTC, illegal entry is the first element required to conduct illegal activities. Thus, illegal actions often associated with people hunting, picnicking, off-road driving, hiking, etc. are not an aspect of the Combat Center environment.

5.1.1 Enforcement Problem Areas

Trespass

Better marking of the Combat Center boundary might reduce accidental trespass, its effect on premeditated trespass would be insignificant. With a boundary as large as the Combat Center's, there are few viable options to reduce trespass. Fencing installation and maintenance are cost prohibitive, and given past experience, the fencing

would probably be torn down or breached in areas. MAGTFTC has considerable experience with attempting to mark its boundaries. Signs and physical barriers have routinely been torn down or stolen. Boundary markers constructed of dirt-filled, concrete-capped, 55-gallon drums were moved or destroyed. These boundary marking efforts have been used at Maumee Mine, America Mine, and Bullion training areas.

Military units occasionally unintentionally trespass on surrounding lands. This is generally accidental, and may be related to any number of training related factors.

Off-Road Vehicle Activity

Much, if not most, trespass is associated with unauthorized off-road vehicle (ORV) activity. Non-military ORV activity is illegal. Some ORV activity occurs along most of the Combat Center boundary, but it is concentrated along the common 17-mile boundary with the Johnson Valley Off-Highway Vehicle Area. The southern end of this shared boundary is most commonly violated (Bureau of Land Management, 1992). The southwestern boundary of the Combat Center is also often intentionally violated by ORV users.

Another problem associated with illegal ORV use is interference with ongoing military activities. An ORV sighting can disrupt military training to varying degrees depending upon the location of the sighting. Unauthorized person sightings can disrupt hundreds of military personnel in the field and airborne aircraft with ordnance.

The matter most critical to natural and cultural resources management and protection is disturbance caused to soils and vegetation. This may seem insignificant compared to obvious disturbance done by military maneuvers, but ORV effects are cumulative. ORV drivers, especially motorcycle drivers, prefer places that are relatively unused by military vehicles. The use of small washes and more rugged terrain can be significant in terms of disturbance. Other disturbance includes the crushing of desert tortoises and disturbance to their burrows and other parts of their habitat and disruption to archeological sites.

Finally, most persons who come onto the Combat Center for other illegal activities do so in ORVs. Thus, ORV use is often combined with more serious activities.

Trash Disposal

Trash disposal on the Combat Center is illegal. It can be simple littering or of a truck-load magnitude. Trash is unsightly, but it has other, more serious implications. Garbage can attract ravens and feral or free-roaming dogs and can concentrate activities of natural predators. This, in turn, can affect desert tortoise mortality (Section 4.5.4.2). Trash can also entangle tortoises, leading to their death.

5.1.2 MAGTFTC Enforcement System

The size of the Combat Center and its rugged terrain present major enforcement problems. Violations inevitably start at the boundary, which is about 163 miles long. Much of the Combat Center boundary is relatively inaccessible to most vehicles. MAGTFTC has neither the personnel nor the equipment to adequately enforce encroachment of range areas.

Enforcement personnel at the Combat Center do not receive training specific to natural resources protection. Most enforcement activities are reactions to ongoing violations. There is little enforcement patrol of range areas.

Military police at the Combat Center emphasize enforcement at Mainside and nearby areas. Range personnel within Operations and Training conduct most range-related enforcement as part of their ongoing military training support. This enforcement is directed against trespass. Trespassers can either be escorted off-base or prosecuted.

The 1997 Sikes Act Improvement Act included two specific professional natural resources enforcement items:

- required enforcement of applicable natural resource laws (including regulations); and
- an expansion of Department of Defense authority stating that, "*All Federal laws relating to the management of natural resources on Federal land may be enforced by the Secretary of Defense with respect to violations of the laws that occur on military installations within the United States.*"

5.1.3 Alternative 1 (Preferred)

Since enforcement is a responsibility of the Provost Marshal Office at MAGTFTC, a specific natural resources project for enforcement is not pertinent to this INRMP. However, the following goal and objectives are pertinent to the installation.

Goal. Assure legal compliance of military and civilian activities with regard to natural resources on the Combat Center.

Objective 1. Maintain a law enforcement program for military and civilian activities that relates to natural resources protection on Combat Center training areas.

Objective 2. Coordinate natural resources enforcement activities with other agencies when professional natural resources enforcement assistance is required.

5.1.4 Alternative 2 (No Action)

Alternative 2 included a major program for upgrading the natural resources enforcement program to include the use of professionally-trained officers. This option was not implemented due to general Defense personnel downsizing and minimal justification for full-time professional officers.

5.1.5 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the No Action Alternative if it would have been implemented.. Permanent civilian enforcement officers could be hired and trained in natural resources enforcement, such as has occurred on some other military installations.

5.1.6 Other Options Eliminated

The natural resources enforcement program is minimal at the Combat Center. Reduced program emphasis is not a viable option.

5.2 Awareness

The MAGTFTC natural resources program is founded on the principle of using stewardship to produce both user benefits and resources protection within requirements of the military mission. The U.S. Marine Corps has a long tradition of leadership in Defense natural resources management, and MAGTFTC is building upon this reputation and enhancing it.

The conservation awareness aspect of the program is largely responsible for creating conditions needed to conduct professional natural resources management at the Combat Center. Programs such as bighorn sheep re-introduction, nature trails, and unique area protection are generally popular and easy to "sell." However, programs such as desert tortoise protection, protection of ostensibly "boring" desert, xeric landscaping, and protection of snakes and obscure plants can be controversial, both on the Combat Center and in the surrounding community. A conservation awareness program must be directed to both installation and external interests if it is to be effective.

5.2.1 Project - Mission Awareness

Project: Mission Awareness
Driver: Maintaining the capability of training lands to support the military mission (Sikes Act); Compliance with Endangered Species, National Historic Preservation, and Archeological Resources Protection acts; Stewardship
Funding Priority: Class 2
Project Timing: Objective 6 - by 2002; Other objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: External support and in-house
Success Monitoring: Completion of objectives

Goal 1. Develop an awareness of values of and requirements for natural and cultural resources protection on the Combat Center to support sustained military training.

Goal 2. Educate military users how to minimize impacts to the land and natural resources to sustain and enhance training.

5.2.1.1 Alternative 1 (Preferred)

Mission awareness is targeted toward all levels of the military personnel using Combat Center training areas and DoD civilians who affect training. Other audiences include family members stationed at the Combat Center, other civilian employees, and those external persons who have a demonstrated interest in training activities on the Combat Center. Mission awareness seeks to increase awareness of environmental regulations pertaining to conservation of training lands.

Military personnel awareness programs foster a conservation ethic in those who use Combat Center lands to preserve the capability of training lands to indefinitely sustain the military mission. This type of program has been evolving at the Combat Center over the past several years through individual projects. The mission awareness project is a means to focus this effort specifically toward those persons using Combat Center lands.

The mission awareness project will also support other NREA organizations. Programs such as cultural resources protection, hazardous materials spill prevention and cleanup, pollution prevention, NEPA requirements, etc., are

dependent upon awareness programs for success.

Krzysik and Trumbull (1996) offered insights into military personnel awareness programs at the Combat Center within their *Environmental Education* section. They suggested three focal points to the program:

- a reduction in unnecessary off-road impacts;
- a reasonable awareness of the vulnerability of wildlife, vegetation, and soils, combined with an attempt to minimize environmental disturbance during field operations; and
- instruction to avoid collecting, harassing, or killing wildlife, especially snakes.

These authors noted that disturbance during training is not attributable to malice or ill intent. Although most military personnel express a general concern for the environment and wildlife, they perceive the Mojave Desert as a barren, lifeless wasteland. Educational programs must change this perception if disturbance prevention is to be effective.

The Desert Tortoise (U.S. Marine Corps, 1998) and *Native American Rock Art* (U.S. Marine Corps, 1996b) are examples of materials produced by MCAGCC to educate a wide audience from Marines training at the Combat Center to the military and civilian community to the outside public. These professionally produced, short brochures describe valuable natural and cultural resources at the Combat Center and provide readers with ways they can personally help preserve these resources.

At least 30 days prior to CAXs, a MAGTFTC briefer travels to installations with Marine units involved in CAXs. This briefer meets with CAX planners and unit leaders. Other CAX briefings are presented to about 30,000 Marines annually following their arrival at the Combat Center. Both briefings explain requirements of hazardous and solid waste management, natural and cultural resources management, and locations of restricted areas.

Field cards (*Training and the Environment*) are given to Marines at CAX and other briefings. These cards have brief summaries of the value of the Combat Center and restrictions on vehicle movement; training activities; petroleum, oil, and lubricants use; and desert tortoise issues.

MAGTFTC also provides quarterly, one-day awareness meetings for resident personnel, both civilian and military, to explain changes in environmental policies and regulations, upcoming inspections, environmental construction or repair that is upcoming or underway, and cultural and natural resources awareness.

MAGTFTC uses posters to enhance military personnel awareness. Headquarters, Marine Corps developed a poster for desert tortoise awareness, and MAGTFTC developed several displays and exhibits on cultural resources.

In 1995 the Combat Center completed a video to help military personnel training in the field conserve natural resources and comply with environmental regulations and laws. In 1997 the Combat Center initiated a program with six videos that show proper methods for the management of hazardous and solid wastes for all civilian and military personnel (U.S. Marine Corps, 1997).

CCO 5090.1B (*Environmental Protection*), signed by the Commanding General, is a significant environmental management tool for MAGTFTC. In recent years the awareness value of this Combat Center order has been enhanced through the use of NREA-generated GIS maps of areas where Marines are expected to emphasize protection of valuable natural and cultural resources.

Objective 1. Revise mission awareness materials (*e.g.*, field card, posters, video) as needed to maintain the accuracy and mission-relevancy of these materials.

Objective 2. Continue to provide CAX and other mission briefings to military personnel training at the Combat Center and update these presentations as needed to maintain their accuracy and mission-relevancy.

Objective 3. Develop new mission awareness materials and briefings as needed to ensure support of the military mission, compliance with environmental laws (*e.g.*, NEPA, Endangered Species Act, NHPA, ARPA); and stewardship of public lands.

Objective 4. Use the mission awareness project to emphasize wildfire prevention and reporting.

Objective 5. Use the mission awareness project to increase awareness of the desert tortoise and its habitat on the Combat Center and to avoid injury or mortality of desert tortoises and other sensitive species during training and other activities.

Objective 6. Evaluate the need to incorporate personnel safety (in terms of natural resources) into mission awareness materials (*e.g.*, terrain risks during maneuvers, flash flood hazards, venomous animal awareness).

5.2.1.2 Alternative 2 (No Action)

Environmental awareness plans described in the Multiple Land Use Management Plan were created to establish a program similar to the Preferred Alternative. Some have been completed; others are underway; and others have been discarded as impractical. Above objectives 1-3 and 5 would be similar under this alternative, but objectives 4 and 6 would not be included.

5.2.1.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

5.2.1.4 Other Options Eliminated

The mission awareness project is not specifically required for legal compliance, but many materials and programs are directly related to protected natural or cultural resources, and the entire program is directed toward sustainment of the capability of the installation to support the military mission, as required by the Sikes Act. Thus, while there are many options on techniques for educating military users of the installation, the option to not educate these personnel is not viable. Materials used at the Combat Center are developed specifically for military personnel, often based on experience on other military installations. It is questionable whether other materials and briefings could be developed with better cost:benefits.

Projects using education to protect sensitive species, particularly the desert tortoise, were developed in preparation for requirements of the anticipated Biological Opinion. Thus, while there are options to specific methods used, the option to not use education is not viable, and changes in the program could require consultation with the USFWS.

5.2.2 Project - Public Awareness

Project: Public Awareness
Driver: Assist with compliance with Endangered Species, National Historic Preservation, and Archeological Resources Protection Acts; Stewardship
Funding Priority: Class 3
Project Timing: All objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None required
Vehicle for Project Implementation: In-house
Success Monitoring: Completion of objectives

Goal. Provide information to MAGTFTC and external interested communities regarding natural resources and associated management programs at the Combat Center.

5.2.2.1 Alternative 1 (Preferred)

Personal Communications

Person-to-person communication between knowledgeable NREA personnel and interested persons is the most effective means of getting specific information to identifiable audiences. However, this is a slow process which reaches a small percentage of large target audiences. Its overall effectiveness depends upon the number of knowledgeable NREA personnel who can communicate with others on a one-on-one basis. Personal communication is most effective when a relatively small group of people affect a large opinion base. Such persons may include ranking enlisted or officer personnel, environmental organization officers, outside agency personnel, and civic leaders. A few persons can create active public opinion.

Objective 1. Improve the general program knowledge of all persons associated with the Natural Resources Branch, NREA, particularly those who come into regular contact with interested persons.

Objective 2. Use key persons for support of MAGTFTC conservation programs, particularly those that may be controversial.

Prepared Talks

Prepared talks are given at the request of various groups, most commonly civic clubs, such as Lions and Rotary. These clubs need monthly speakers, and natural resources and the environment are popular topics. Local schools may invite interesting speakers to add to the standard course work.

In many cases, topics can be chosen to explain specific management programs, that need public understanding and support. General presentations about the MAGTFTC natural resources program can create a favorable perception that MAGTFTC is taking care of the land and wildlife. Time spent preparing good slide presentation for such occasions may have long-term benefits.

Objective 3. Provide prepared talks, dependent upon personnel and time availability. Whenever possible, use these opportunities to explain contemporary natural resources issues and management.

Use of Media

Newspapers

As an index to the use of media on MAGTFTC, in 1996-97 over 130 newspaper articles and 13 technical publications were used to spread the word on environmental and conservation issues involving the Combat Center (U.S. Marine Corps, 1997).

The MAGTFTC newspaper, *Observation Post*, is probably the most efficient means to inform the Twentynine Palms community. The base newspaper can be used to explain and publicize programs or develop attitudes that enable the implementation of new programs. Articles can target a wide range of readers, or they can be written to impress one or more specific reader categories.

Feature articles by staff writers or NREA personnel can reach out with the conservation message. Sometimes an outside viewpoint is more credible, especially when natural resources personnel are the topic. Awards presented to the program or its personnel are a good topic for such features. Picture features are a common use of natural resources material by the MAGTFTC newspaper. Pictures present easy to grasp information to the widest audience possible using newspapers.

Outside newspapers occasionally want information on the MAGTFTC natural resources program. Such interviews are coordinated with the Public Affairs Office.

Electronic Media

Outside television and radio seldom cover natural resources issues at MAGTFTC. If this were to occur, it would be coordinated by the Public Affairs Office.

Channel 6 is the MAGTFTC television station. It is available to people in on-base housing, barracks, and many workplaces. This channel offers NREA a means to provide specific information to the MCAGCC community.

A more recent form of electronic media is the MAGTFTC website, www.29palms.usmc.mil, which was first published in 1996. This website includes a brief description of Combat Center natural resources. There are many opportunities to use this form of public outreach (*e.g.*, NEPA dissemination, database dissemination, interactive personal communication, requests for program/data input).

Objective 4. Use newspapers, television, and radio to inform the Twentynine Palms-MAGTFTC community of matters important to the MAGTFTC natural resources program. Focus this effort on desert tortoise protection, invasive plant and animal species, wildfire-annual grasses issues, native ecosystem protection, and xeric landscaping.

Objective 5. Use Channel 6 to reach the MAGTFTC local community with natural resources projects and plans that are important to this community.

Objective 6. Regularly update natural resources information on the MAGTFTC website.

Objective 7. Consider innovative means to use the MAGTFTC website to further goals and objectives of the MAGTFTC Natural Resources Branch.

Special Events

Special events are used to spread the message that MAGTFTC is interested in the environment and natural resources. MAGTFTC assists the Twentynine Palms Historical Society in an off-base Earth Day celebration.

Objective 8. Participate in Earth Day events as appropriate, and evaluate other special events for their usefulness in promoting the NREA image and/or programs.

Watchable Wildlife

MAGTFTC has developed a wildlife viewing and indigenous nature area around the perimeter of a stormwater retention pond near family housing. Landscaping for the area uses native plants suited to the dry, boron-, sodium-, and calcium-rich soils in the project area. San Diego State University assisted with the landscaping (U.S. Marine Corps, 1997).

Objective 9. Maintain the watchable wildlife area and evaluate other opportunities for similar projects.

5.2.2.2 Alternative 2 (No Action)

Alternative 2 is similar to the Preferred Alternative except that objectives 6 and 7 would not be included, and Objective 9 was in the planning, rather than maintenance, stage.

5.2.2.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

5.2.2.4 Other Options Eliminated

Although public awareness programs assist with compliance with federal laws, none of the programs are legally mandated. Programs could be reduced or expanded to any degree desired. Personnel constraints restrict the option to significantly increase public awareness activities.

5.3 Outdoor Recreation

Outdoor recreation enhances the quality of life for military and civilian personnel. Marine Corps lands with suitable natural resources are to be managed to allow outdoor recreational opportunities, consistent with the Sikes Act. For the purposes of this INRMP, outdoor recreation is defined as recreational programs, activities, or opportunities that depend on the natural environment.

5.3.1 Military Mission Considerations

The military mission has priority over outdoor recreation involving range access. If recreational or management activities conflict with military activities, the military mission comes first. MCAGCC offers the finest opportunity within the Marine Corps, and possibly the Department of Defense, to train under realistic conditions. This will not be compromised.

5.3.2 Public Access

Public access is generally denied with regard to outdoor recreation at MAGTFTC. The nature of the military mission with its rapidly changing maneuver and firing activities, combined with inherent dangers associated with unexploded munitions, make public access for outdoor recreation on training areas an incompatible use.

5.3.3 Alternative 1 (Preferred)

Since outdoor recreation is prohibited on training areas and is not a direct responsibility of NREA on Mainside, a specific natural resources project for outdoor recreation is not pertinent to this INRMP. However, the following goal and objectives are pertinent to the installation. The accomplishment of Objective 2 (below) is included in the project on public awareness programs (Section 5.2.2.1, Objective 9).

Goal. Provide opportunities for the MAGTFTC community to participate in high quality, safe outdoor recreation, consistent with requirements of the MAGTFTC military mission.

Outdoor recreation opportunities associated with natural resources are limited at MAGTFTC. The only areas available for such recreation are located in and around Mainside. There are opportunities for horseback riding and hiking adjacent to Mainside. The recent development of an interpretive trail around a storm water retention pond has added opportunities for nature study, particularly bird watching, and hiking.

Excellent outdoor recreation opportunities are available near the Combat Center. Johnson Valley ORV area, on the western boundary of the Combat Center, is specifically designated for ORV recreational use. Only 10 miles to the south, Joshua Tree National Park has tremendous opportunities for hiking, nature study, cultural resources appreciation, and related activities. Two wilderness areas on southeastern and northwestern boundaries of the Combat Center include high quality desert wilderness adventure opportunities for "desert rats." Just to the west is Southern California's high mountain playground, Big Bear. This rugged, forested region offers hiking, camping, hunting, fishing, and snow skiing. For Marines stationed at MAGTFTC, there are some of the finest outdoor recreation opportunities available in the nation within a short driving distance.

Objective 1. Continue MAGTFTC policies toward public access for outdoor recreation.

Objective 2. Maintain and improve the interpretative trail at the stormwater retention pond, considering the use of blinds and additional signs.

5.3.4 Alternative 2 (No Action)

The Multiple Land Use Management Plan described plans to develop the interpretative trail at the stormwater pond, so that action is now one of maintenance, not development. Policies toward outdoor recreation access are identical with the Preferred Alternative.

5.3.5 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative.

5.3.6 Alternative 3 (Other Options)

It is difficult to increase access opportunities for outdoor recreation within constraints of the military mission, which is very land-use extensive, range scheduling exclusive, and inherently dangerous to nonmilitary users. Since training area recreational access is closed, there is no option to tighten recreational access policies.

There is no requirement to maintain the interpretative trail, but there are options to extend this trail system. Funding for additional nature trails is difficult to obtain since the Legacy Program has been significantly reduced.

5.4 Cultural Resources Protection

Cultural resources management at MAGTFTC is provided in accordance with Section 106 and Section 110 of the National Historic Preservation Act (NHPA) (16 U.S.C. Section 470, as amended), the Archeological Resources Protection Act (16 U.S.C. Section 470aa-47011), the American Indian Religious Freedom Act (42 U.S.C.), the Native American Graves Protection and Repatriation Act (25 U.S.C. Section 3001 *et seq.*), Executive Order 11593 (*Protection and Enhancement of Cultural Environment*), DoD Directive 4710.1 (*Archeological and Historic Resources Management*, 1984), and MCO P5090.2A, Chapter 19 (*Historic and Archeological Resources Protection*).

The management of cultural resources on MAGTFTC is a mission of the Natural Resources Branch, NREA. The Cultural Resources Section has a full-time Cultural Resources Manager, a Senior Staff Archaeologist, and a part-time Curator who are responsible for all aspects of cultural resources management, including coordination with the California State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation, Native American tribal organizations and the public.

Cultural resources management began in earnest on the Combat Center in the late 1980s. In 1989 the Combat Center completed a draft Historic Preservation Plan (Cottrell, 1989), and in 1993 the Combat Center finalized this Plan (Cottrell and Maxwell, 1993). In 2000 a final Programmatic Agreement was negotiated with the SHPO and the Advisory Council on Historic Preservation. This agreement began the process of the development of an Integrated Cultural Resources Management Plan, that will become the Section 106, National Historic Preservation Act compliance agreement. This programmatic agreement was coordinated with interested Native American tribes. MAGTFTC is now preparing the Integrated Cultural Resources Management Plan (Jones & Stokes, 2000).

The primary source of outside assistance is the SHPO who is also the primary regulator with regard to cultural resources in California. The SHPO will provide Section 106 guidance as the INRMP is implemented.

5.4.1 Cultural Resources

5.4.1.1 Pre-military Land Use

Native Americans entered the Mojave Desert approximately 12,000 years ago and occupied the region until the early 20th century. First attracted to the perennial springs and lake shores as prime hunting and gathering locations, the American Indians continued to hunt game and gather a wide variety of floral resources even as the area became hotter and drier through time. In addition to food gathering activities, the Combat Center hosts a number of

locations where naturally occurring sources of toolstone, such as chert, chalcedony, jasper, and rhyolite, were quarried for the production of stone tools, such as spear and dart points, arrowheads, scrapers, knives, and axes. Lacking metal tools, the high quality toolstone found on the Combat Center was particularly attractive to many American Indian groups. The use of the area by a variety of Native American groups is evidenced by the variety of distinct stylistic images found at rock art sites located aboard the base.

At the time of European contact, the lands now occupied by the Combat Center were used by the Serrano and Chemehuevi (O'Neal 1957; Strong 1929, Kroeber 1925). In 1856, land was set aside for the Twentynine Palms Indian Reservation. By 1913, the reservation was vacant.

Around the 1850s, after the Mexican-American War ended with the Treaty of Guadalupe Hidalgo, settlers began to push westward. Also at this time, ranchers and cattlemen were seeking faster trade routes between coastal California and the Midwest. Some routes were established through the Morongo Basin; other routes included the U.S. Government Road (now Interstate 40) just north of the Combat Center boundary, which served as a military route between forts.

During the 1850s, miners were spreading throughout California deserts in search of gold. Some of these miners became the first settlers of Twentynine Palms. The oasis and other areas of low-lying relief provided water for living necessities and mining operations. In 1873 the southern section of the area was designated the Palms Springs Mining District. Mining activities accelerated in the 1880s with the opening of the railroad. Many abandoned mines exist throughout the Combat Center, especially in mountainous areas, such as Sunshine Peak. Temporary trails to access these mines created minor disturbance, and resources must have been used for firewood, shelter, and food. The early mining flurry died down by the turn of the century, and the oasis region became comparatively quiet and inactive (Ludwig, 1989). During the 1920s and 1930s, limited mining again took place but never provided a stable economic base. From 1900-1940 the oasis was a small settlement of miners, prospectors, ranchers, and settlers.

Historic settlement in the region followed a trend that must have been in place for thousands of years. American settlers congregated at Mara Oasis, Mesquite Spring, and Surprise Spring as focal points of mining and ranching activity. After World War I a small number of settlers were attracted by homesteading. In the 1930s Twentynine Palms eclipsed neighboring settlements such as Mesquite Spring and Surprise Spring (U.S. Marine Corps, 1996b).

5.4.1.2 Military Use

Military use of the land prior to the present is summarized in Section 3.3.

5.4.1.3 Cultural Resources Inventory

Historic resources at the Combat Center include the Surprise Spring site (historic component) as well as a number of historic mines. There are 59 known mines/mining sites on the base, all of which have been evaluated for listing in the National Register of Historic Places (NRHP). Of the 59 mines/mining sites, 32 were found to be significant and eligible for listing in the National Register. Mining sites studies have identified two mining districts; the Lava Bed Mining District in the Sunshine Peak Training Area and the Delta Mining District in the mountains to the west of the main training corridors in Prospect and Delta training areas. The two mining districts are located in remote mountainous areas of the installation, and military mission impacts are relatively low.

Four of the individually eligible mines/mining related sites are located in areas accessible to tracked and wheeled

vehicles during training and were steadily deteriorating as a result of impacts related to the training mission. These four sites, MauMee Mine, Crystal Mine, Kenton Mill, and Lavic Lake Mining Camp, were subject to data recovery procedures to mitigate adverse effects resulting from training.

In addition to the districts and sites noted above, there are seven individual sites that are eligible for listing in the National Register. These include War Eagle Mine, Bullion #1, Coltrane Mining Camp, Hidalgo Mountain Mine #2, Emerson Lake #1 and #3, and Cleghorn Mining Camp. These sites are being monitored to determine long-term impacts of training on these resources.

Buildings and structures were inventoried in 1999. None were found to be eligible for listing in the National Register.

There are probably thousands of prehistoric and historic archaeological sites on the Combat Center. Over 1,175 prehistoric archaeological sites have been officially recorded as a result of archaeological surveys completed on the installation. These include rock art sites, rock shelters, lithic prospects and quarries, lithic scatters, and habitation sites. One of the most visible sites on the Combat Center is the Foxtrot Petroglyph Site, within Cleghorn Pass Training Area, which includes over 1,500 images on over 400 petroglyph and pictograph panels extending over a three kilometer area. The Foxtrot Petroglyph site was formally listed in the National Register in 1995.

To date, 219 archeological sites have been evaluated for National Register eligibility. One hundred are recommended for listing on the NRHP, and determination is pending on 42 sites. Archaeological investigations have suggested site concentrations around dry lakes, although numerous sites have been located in various locations in many of the training areas of the installation.

Overall, the limited survey coverage of MCAGCC (15.5% or 92,586 acres) does not provide a clear pattern of archaeological resource distribution. The State Archaeological Information Center recommends that field surveys be conducted to identify historical resources within areas of potential effect.

5.4.1.4 National Register of Historic Places Eligibility

Eligibility of archeological sites for inclusion in the NRHP is the principal criteria determining management prescriptions. Generally, sites fall into one of three categories with regard to NRHP eligibility:

Eligible: These sites have been determined eligible for the NRHP and therefore are subject to protection. They should not be affected without consultation per Section 106 of the NHPA and development of a plan to mitigate adverse effects.
Ineligible: These sites have been determined ineligible for the NRHP and do not require protection from adverse effects.
Potentially eligible (intermediate): Further investigation is required to determine NRHP eligibility. Therefore, these sites are potentially eligible for the NRHP and require protection until determinations of eligibility can be made.

5.4.1.5 Native American Consultation and Coordination

Various laws and regulations require MAGTFTC to consult with Native Americans regarding Marine Corps activities on sites within the installation. The NHPA requires that federal agencies consult with the Advisory

Council on Historic Preservation regarding any proposed action that has the potential to affect a property on or eligible for the NRHP. This includes consultation and coordination with the SHPO and interested parties, including but not limited to Native Americans.

The Archaeological Resources Protection Act requires that archaeological resources on public and Indian lands be protected. This includes notifying Indian tribes, in advance, of possible harm to sites with religious or cultural importance.

The Native American Graves Protection and Repatriation Act (NAGPRA) protects the ownership and control of Native American human remains and certain related cultural items (funerary objects, sacred objects, or objects of cultural patrimony) excavated or discovered on federal lands. If human remains or such cultural items are discovered during projects, work must stop, and a reasonable effort must be made to protect the discovery. Potentially affiliated Native American tribes must be notified, and requirements of Section 106 of NHPA and NAGRPA must be followed for excavation and disposition of the remains. NAGPRA also requires a 30-day delay period after the discovery of human remains or such cultural items before project work in the area of the discovery can resume. Work may resume earlier if consultation and agreement occur.

The American Indian Religious Freedom Act covers the protection of intangible, ceremonial, or traditional values and concerns not tied to specific cultural properties. MAGTFTC must establish contact with interested Native American tribes during the regular course of the NHPA Section 106 process.

Executive Order 13007 (*Indian Sacred Sites*) stipulates that if a federally-recognized tribe or representative of an Indian religion identifies a sacred site on the Combat Center, the installation commander shall to the extent practicable and consistent with the Base's mission, accommodate access to and ceremonial use of such sites, and avoid adversely affecting the physical integrity of such sites.

5.4.2 Natural Resources Management Implications

NREA will continue to conduct field surveys, as required by Section 110 of the NHPA and ARPA to identify archeological and historical resources within the Combat Center boundaries. An Integrated Cultural Resources Management Plan will be developed to properly manage historic and cultural resources at the Combat Center and comply with federal regulations. These actions may affect natural resources management on the Combat Center.

Natural resources management on the Combat Center has little potential to affect cultural resources. Conversely cultural resources management on the post seldom significantly affects natural resources management. In the case of cultural resources site evaluation or mitigation, the natural resources staff will survey the area for threatened and/or endangered species. If a federally-listed species is encountered, a Section 7 consultation with USFWS will be requested, and upon approval of USFWS, the species will be relocated and investigation will continue. If no listed species are encountered, site investigation can continue. Upon completion of the site investigations, the site will be restored to as close to its natural condition as possible.

Of all practices associated with natural resources management on the Combat Center, erosion control and land restoration projects (Section 4.9.2) have perhaps the greatest potential to affect archeological sites. Projects involving decompaction, earth moving, and fill deposition can disturb or bury archeological sites. Generally, however, effects to archeological sites from reduced erosion are positive. Cultural resources surveys are done in project areas prior to initiation of work. Even with proper review, natural resources projects still have potential to affect archeological sites through accidental discovery.

Training land management projects (Section 4.9.2) can be planned to specifically protect sites from erosion, and erosion control and vegetation projects, in general, protects known and unknown sites downslope.

Numerous provisions of this INRMP benefit cultural resources management on the Combat Center. These include *Training Land Management* (Section 4.9.2), *Special Interest Area Protection* (Section 4.13), *Enforcement* (Section 5.1), *Mission Awareness* (Section 5.2.1), and *NEPA Implementation* (Section 5.5).

5.4.3 Project - Cultural Resources Protection

Project: Cultural Resources Protection
Driver: Compliance with various cultural resources laws and regulations; Stewardship
Funding Priority: Class 1
Project Timing: All objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: SHPO and Advisory Council on Historic Preservation
Vehicle for Project Implementation: In-house
Success Monitoring: Completion of objectives

Goal. Implement this INRMP in a manner consistent with the protection of cultural resources at the Combat Center.

5.4.3.1 Alternative 1 (Preferred)

Objective 1. Implement provisions of the Integrated Cultural Resources Management Plan; when completed, that relate to natural resources management.

Objective 2. Consider natural resources projects when planning cultural resources surveys, and use results of cultural resources surveys to plan natural resources projects.

Objective 3. Avoid or mitigate adverse effects to cultural resources from natural resources through proper review and planning. Submit proposed projects, as part of NEPA review, to the Cultural Resources Manager for approval, determinations of effect, and Section 106 consultation, as necessary.

Objective 4. Maximize use of GIS archeological information in planning and implementing training land management and other ground-disturbing projects.

Objective 5. Take the following protective measures upon discovery of sites.

- Cease ground disturbing activities immediately and report to the Cultural Resources Manager upon discovery of potential cultural deposits.
- Consider alternatives for moving the project to another location.
- If remains are determined by the Cultural Resources Manager to be natural, do no further investigation and resume the project. Protect the site until such time that its eligibility for the NRHP has been determined and appropriate treatment has been determined.

Objective 6. Use natural resources techniques and projects to protect cultural resources sites.

5.4.3.2 Alternative 2 (No Action)

Alternative 2 is the same as the Preferred Alternative except that under this alternative there would be more land restoration projects, that could potentially increase the level of cultural resources concerns.

5.4.3.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 is the same as the Preferred Alternative.

5.4.3.4 Other Options Eliminated

There are few viable options with regard to protection of cultural resources during implementation of this INRMP. Laws and regulations require surveys and protection or mitigation of significant cultural resources sites on federal lands. Procedures are detailed, and the proposed action follows these procedures. Deviations from the proposed action would require, at a minimum, consultation with the SHPO.

The use of natural resources to protect cultural resources has options in terms of scope of these projects. The potential to protect sites using active erosion control and site marking is almost unlimited. Thus, the number of projects could be increased or decreased.

5.5 National Environmental Policy Act Implementation

The National Environmental Policy Act (NEPA) was enacted to disclose environmental concerns with human activities and resolve them to the best degree possible. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. NEPA regulations (MCO P5090.2A, Chapter 12, *National Environmental Policy Act*) require mitigation or full disclosure of disturbance to the environment. NEPA was not legislated to stop actions. Rather, it was crafted to identify environmental problems, providing an opportunity to resolve them using planning at early stages of project development.

5.5.1 Responsibilities and Implementation

5.5.1.1 Responsibility

NEPA is a recognized way of doing business at MAGTFTC. NEPA implementation is a responsibility of NREA. At MAGTFTC project proponents are generally responsible for providing NEPA documentation. Thus, while NREA is responsible for NEPA, many NEPA documents are prepared by other organizations, with NREA oversight and approval. Since many projects at MAGTFTC go through the Minor Construction process, the Minor Construction Board is often used to inform project proponents of NEPA requirements and to establish initial NEPA coordination. The process of reviewing and preparing NEPA documentation often involves direct coordination with other natural resources partners, particularly those listed in Chapter 2 of this INRMP.

5.5.1.2 NEPA Documentation

The most common NEPA document prepared for projects that do not impact natural/cultural resources or the environment is a Categorical Exclusion. This simple documentation generally works well for routine projects such as field motor pools, small digging projects, and similar projects where natural sites are not disturbed. NREA has authority to approve these documents.

Environmental Assessments are required when the screening criteria for a categorical exclusion are not met. Examples could include a new military exercise, construction of a new range, actions involving wide geographic areas, projects that may affect wet areas or other sensitive plant communities, projects that may affect threatened or endangered species or cultural resources, and major plans (such as this INRMP). EAs require Commanding General/Officer approval, and if appropriate a Finding of No Significant Impact.

If the environmental assessment process determines that a Finding of No Significant Impact is not appropriate, the project may either be modified to remove significant impacts or mitigation can be added. The environmental assessment process may then be repeated, and if modifications or mitigation are sufficient to remove significant impacts, a Finding of No Significant Impact may be published. If these options fail, the action may be dropped or an Environmental Impact Statement may be prepared.

This INRMP/EA fulfills the requirement for NEPA documentation for the natural resources program as a whole.

5.5.1.3 Mitigation

Mitigation is an excellent way to either consider less damaging options or provide means to off-set disturbance to the environment and should be considered throughout the NEPA process. Below are five general mitigation tactics:

Avoidance: Avoid adverse impacts on natural resources by not performing activities that would result in such impacts. Confine construction to areas where no significant impacts would occur to natural resources.

Limitation of action: Reduce the extent of an impact by limiting the degree or magnitude of the action. Minimize impacts of construction projects by arranging timing, location, and magnitude of actions so that they have the least impact on natural resources.

Restoration of the environment: Restore the environment to its previous condition or better. This could include revegetating an area with native plants after it has been disturbed by construction projects.

Preservation and maintenance operations: Design the action to reduce adverse environmental effects. This could involve actions such as monitoring and controlling pollution, contamination, disturbance, or erosion caused by construction projects that would impact natural resources.

Replacement: Replace the resource or environment that will be impacted by construction projects. Replacement can occur in-kind or otherwise, on-site or at another location. This could involve creation of the same type or better quality habitat for a particular impacted wildlife species or creation of habitat for another species.

Mitigation that is identified in a Finding of No Significant Impact is a Class 1 "must fund" for environmental

purposes. This provides a reliable mechanism to fund mitigation included in NEPA documents.

A critical feature of the NEPA process is mitigation of disturbance to natural resources. MAGTFTC is committed to fulfilling its mitigation responsibilities. When the installation makes a commitment to another agency with regard to mitigation, this commitment is fulfilled.

5.5.2 NEPA and Natural Resources Management

NREA uses NEPA to ensure its natural resources activities (as described in this INRMP) are properly planned, coordinated, and documented. It also uses NEPA to identify problems associated with other organizations' projects that affect the installation's natural resources. Thus, NREA is both a proponent and responsible agent for NEPA.

Siting range-related projects is perhaps the most basic decision that requires input from natural resources personnel. If this phase is done within the cooperative spirit of NEPA, most other environmental problems associated with new projects or military missions are generally resolved with relative ease. Decisions such as specific siting or mission planning should be cooperatively discussed prior to preparing actual NEPA draft documents. While it is often the proponent's role to prepare NEPA documentation, this task is greatly facilitated if the proponent is preparing the document based on ongoing discussions with environmental experts.

The MAGTFTC Environmental Impact Working Group is a subcommittee of the Installation Environmental Impact Review Board. This working group has representatives from units as well as appropriate technical experts to help do NEPA.

An important offshoot of proper NEPA implementation is that projects are often enhanced by the effort. Siting is one of the most common examples of such project enhancement. When natural resources managers understand mission/project requirements in terms of land features and requirements, they can offer options to mission or project planners that avoid environmental conflicts.

5.5.3 Project - Use of NEPA

Project: Use of NEPA
Driver: Compliance with NEPA and other federal laws affected by individual projects; Stewardship
Funding Priority: Class I
Project Timing: All objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None
Vehicle for Project Implementation: Contractors and in-house
Success Monitoring: Completion of objectives

Goal 1. Use NEPA to identify projects and activities on the Combat Center that might impact natural resources and work with project planners to resolve issues early in the planning process.

Goal 2. Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA.

Goal 3. Help MAGTFTC comply with NEPA.

5.5.3.1 Alternative 1 (Preferred)

Objective 1. Document effects of implementation of this INRMP through an environmental assessment that is embedded in this document.

Objective 2. Reference this INRMP/EA in descriptions of affected environment to reduce verbiage in other NEPA documents.

Objective 3. Classify mitigation as a "must fund" for budgetary purposes.

5.5.3.2 Alternative 2 (No Action)

Alternative 2 is the same as the Preferred Alternative except that an environmental assessment was not prepared for the Multiple Land Use Management Plan.

5.5.3.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 is the same as the Preferred Alternative.

5.5.3.4 Other Options Eliminated

There are few viable options regarding NEPA documentation relating to this INRMP. Laws and regulations require the use of NEPA, and U.S. Marine Corps assumes that INRMPs will require environmental assessments. Procedures are detailed, and the proposed action follows these procedures. MAGTFTC could have chosen to prepare a separate environmental assessment for this INRMP rather than a combined document. However, this would not have changed the outcome of the analysis.

This environmental assessment could have been prepared only considering the preparation of the INRMP, which would require individual NEPA documentation for each project as it is implemented. This option would be far more costly. The option to not prepare NEPA documentation for natural resources projects is not legally viable. The option to prepare an environmental impact statement was viable, but there was no reason to assume that one would be required.

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6.0 UNRESOLVED ISSUES

It is not unusual for some natural resources-related issues to be at a stage where the path to issue resolution is unknown or uncertain. Reasons for this status might be the political environment, a lack of scientific information, conflicting agendas, costs, or other roadblocks. Issue resolution difficulties will not prevent MAGTFTC from continuing to work on resolutions. Recognition and a willingness to deal with such conflicts are a part of the process itself.

6.1 Encroachment

Section 5.1, *Natural Resources Enforcement*, discusses problems associated with illegal encroachment, and Section 5.3.2, *Public Access*, mentions the desire for access to portions of the installation for ORV activity. Two points are pertinent:

- Opening the Combat Center training areas to recreational activity is not in the best interests of the installation considering safety risks and impacts on the military mission.
- Reducing illegal access is a highly desirable action on the part of MAGTFTC.

It is understood that there is a public desire for access to a part of the Combat Center just south of Emerson Lake for ORV events, and that there is a record of illegal use by ORVs in many areas, the southwestern and southeastern boundaries in particular. The installation is unable to either open the Combat Center to such recreation or condone illegal use.

The installation has boundary markers and signage around its perimeter. There is a plan to put more markers and signage along the base boundaries and to check them on a more regular basis. Marking the Combat Center boundaries would reduce accidental access, but it might not deter entry for illegal purposes, such as theft of scrap, cultural artifacts, and other materials. Initial costs are inevitably high, and maintenance is generally a problem with most marking options. Using heavy equipment to mark playa lake beds created problems, and similar solutions to other areas could create serious problems with tortoise protection and cultural resources as well as recurring costs. Fencing is a maintenance nightmare even if initial costs can be funded. "Scrapper" thefts make the use of metal or electronic markers very costly.

Improved enforcement would help but would not eliminate the problem. The boundary is so long (over 163 miles) that significant boundary control is very difficult to achieve. Any enforcement activity would have to be targeted toward specific activities in specific locations to be effective at a reasonable cost.

6.2 Ecosystem Restoration

As discussed in Section 4.9.2.1, large scale land/vegetation restoration projects are neither cost effective nor biologically feasible within the Combat Center training lands. MAGTFTC activities are adversely affecting ecosystem functionality on heavily utilized areas. These effects can be minimized in scope through training distribution, emphasizing use of already disturbed areas, but they cannot be mitigated on-site within reasonable timeframes. This unresolved biological issue has little hope of resolution in the foreseeable future.

6.3 Wildfire Risks/Invasive Grasses

The 1996 Multiple Land Use Management Plan (U.S. Marine Corps, 1996a) stated that wildfire risks were minimal on the Combat Center. While the immediate fire risk may still be minimal on the Combat Center, there is now little doubt that this risk is likely to increase as invasive grasses increase in distribution and density. Section 4.12, *Fire Management*, discusses this issue in more detail.

MAGTFTC is examining the threat of wildfires due to invasive grass range expansion and is continuing to develop a wildfire management plan.

Thus, the unresolved issue is primarily invasive grasses with preparations to minimize and suppress fires (the consequence) being the only way to attempt to deal with the issues. This seems to be the only viable option available to MCAGCC at present, as is the case with other lands in the Mojave Desert. There are no known economically or biologically viable means to control the invasion of annual grasses in the foreseeable future.

7.0 IMPLEMENTATION

This plan is only as good as the MAGTFTC capability to implement it. Below are described the organization, personnel, and funding needed to implement programs described in chapters 4 and 5.

7.1 Organization

The natural resources organization of MAGTFTC can implement projects within this INRMP and fulfill their goals and objectives. In 2002-2006 this INRMP will be implemented primarily by the Ecological Support Section, Natural Resources Branch and other organizations within NREA with assistance from other MAGTFTC and external organizations as outlined within this Plan.

7.2 Personnel

7.2.1 Project - Staffing

Project: INRMP Implementation Staffing
Driver: Compliance with Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP; Support of the military mission; Stewardship; Support of regional initiatives
Funding Priority: Class 0
Project Timing: Objective - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None directly
Vehicle for Project Implementation: In-house
Success Monitoring: Completion of objective

Goal. Provide staffing of natural resources management professionals required to effectively implement this INRMP at the Combat Center.

7.2.1.1 Alternative 1 (Preferred)

Full implementation of this INRMP will require the following staff within the Natural Resources Branch, NREA:

Natural Resources Branch, NREA

1	Natural Resources Officer	GS 13

Ecological Support Section

1	Natural Resources Manager	GS 12
1	Natural Resources Specialist	GS 11
1	Land Management Specialist	GS 11
1	Natural Resources Technician	GS 09

Five full-time, permanent positions are required. The above staffing does not include cultural resources even though some of their duties support natural resources. Contract staff are also required to fully implement this

INRMP. GIS support is not listed but is critical to plan implementation.

Objective. Provide staffing for the MAGTFTC natural resources program as indicated in Section 7.2.1. Natural resources law enforcement activities will primarily be conducted by military personnel (Provost Marshall).

7.2.1.2 Alternative 2 (No Action)

The Multiple Land Use Management Plan had nine full time, permanent civilian positions, two of which were for professional law enforcement. It has been deleted as a requirement.

7.2.1.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would require the same inhouse staffing as the Preferred Alternative. Additional projects conducted under this alternative would mostly use contract support.

7.2.1.4 Other Options Eliminated

The above staffing plan is not excessive in terms of staffing at comparable military installations in the nation. Other management options range from zero to much larger staffing. Staffing at significantly lower levels than listed above undoubtedly lead to noncompliance with federal laws and regulations. Thus, this is not a viable option. Staffing at higher levels would increase the scope of natural resources management on the Combat Center with impacts as discussed in Other Options sections throughout this INRMP.

7.2.2 Project - Personnel Training

Project: Personnel Training
Driver: Compliance with Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP; Support of the military mission; Stewardship; Support of regional initiatives
Funding Priority: Class 0
Project Timing: All objectives - ongoing indefinitely (Appendix 7.4)
Regulatory Approvals: None directly
Vehicle for Project Implementation: In-house
Success Monitoring: Completion of objectives

Goal 1. Provide training to natural resources personnel implementing this INRMP.

Goal 2. Disseminate knowledge gained at the Combat Center to improve regional and national natural resources programs.

7.2.2.1 Alternative 1 (Preferred)

NREA has a goal to improve the success of natural resources management activities through professional development and information exchange. This will be accomplished by:

- maintaining staff knowledge of management strategies at the current state of the art through training and participation in or hosting workshops, research presentations, and other activities of regional and national

professional natural resources research and conservation programs and
- sharing information with natural resources experts to ensure maximum benefits of adaptive management and research efforts.

Objective 1. Encourage NREA natural resources personnel to continue their professional development.

Objective 2. Send at least one person to each of the following annual workshops or professional conferences:

- National Military Fish and Wildlife Association annual workshop,
- Army-sponsored Integrated Training Area Management annual workshop,
- Desert Tortoise Council Annual Symposium,
- Headquarters, Marine Corps sponsored training sessions, and
- The Wildlife Society Annual Meeting.

Objective 3. Evaluate other conferences/workshops for their usefulness as training tools, and send personnel to those most justified, based on current training needs and those most related to MAGTFTC activities.

Objective 4. Ensure that natural resources personnel obtain the one-time or occasional refresher training needed to fulfill job requirements.

7.2.2.2 Alternative 2 (No Action)

Alternative 2 is similar to the Preferred Alternative except that it had some references to law enforcement training and slightly different workshops, pertinent to needs at the time the Multiple Land Use Management Plan was prepared.

7.2.2.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 is similar to the Preferred Alternative, but there would be additional training requirements to properly implement some Enhanced Stewardship projects..

7.2.2.4 Other Options Eliminated

Much of the proposed training is specifically targeted toward natural resources managers on military installations. Professional management of natural resources is required by the Sikes Act, implying continuing training to maintain professional skills. Thus, while there are other options to acquire training for natural resources managers at MAGTFTC, the option to not train is not viable. Most other training options would not be as specific to the needs of Combat Center personnel as those avenues outlined in the Preferred Alternative.

7.2.3 External Assistance

Implementation of this INRMP will require active assistance on the part of MAGTFTC partners, both signatory and otherwise. Chapter 2, *Responsible and Interested Parties*, indicates agencies, organizations, and others in this category. Specific needs from organizations external to the Combat Center are indicated throughout this document.

It is impossible for MAGTFTC to hire the specialized expertise as full time staff needed for some projects within

this INRMP. MAGTFTC may require expertise from universities, agencies, and contractors to accomplish tasks within this Plan.

7.3 Project - Data Storage, Retrieval, and Analysis

Project: Data Storage, Retrieval, and Analysis
Driver: Compliance with Sikes Act (implementation of INRMP) and other federal laws affected by this INRMP; Support of the military mission; Stewardship; Support of regional initiatives
Funding Priority: Class 1
Project Timing: Objective 10 - 2004; All other objectives - Ongoing Indefinitely (Appendix 7.4)
Regulatory Approvals: None
Vehicle for Project Implementation: In-house
Success Monitoring: Completion of objectives

Goal. Store, analyze, and use data in an efficient, cost-effective manner.

7.3.1 Alternative 1 (Preferred Alternative)

7.3.1.1 Microcomputers

NREA is well-equipped with regard to microcomputers, having quality personal computers with appropriate printers and other peripherals. There are no major needs with regard to this system beyond normal upgrades and replacement of hardware and software.

Objective 1. Upgrade microcomputer hardware and software as needed during the next five years.

7.3.1.2 Geographic Information System

A GIS allows users to manipulate spatial data (*e.g.* maps, aerial photos, satellite images) in a similar fashion as a data management program allows the analyses and presentation of mathematical data. Data can be purchased and converted into most software formats, or it can either be scanned or digitized directly from maps or aerial photographs. A GIS can analyze different map layers to show the relationship of one map layer to another. For example, if a project involved putting a line-of-sight antenna in a location, a good GIS could map all areas that could be reached by an antenna of a certain height out to a certain distance.

A common use for GIS is for siting construction projects, such as a new firing range. For example, criteria for this project might be that the facility be within four miles of Mainside, exclude archeological and endangered species sites, have less than two percent slope, and have relatively stable soils. GIS could produce a map with all areas having these features. A GIS could also be used to show the relative ability of MAGTFTC to support specific types of proposed military training missions.

In 1995 the Combat Center established a GIS program. The MAGTFTC GIS has quality GIS databases with no major database gaps. Additional database layers regarding the region can be obtained through the Mojave Desert Ecosystem Program.

The following projects are some examples of the uses of the NREA GIS projected during 2002-2006:

- areas most vulnerable to training impacts;
- bighorn sheep movement patterns;
- NEPA documentation alternative selection analyses;
- endangered and rare species habitat map;
- archeological inventory and sites maps; and
- training map with environmental considerations.

Military commanders and operations and exercise planners are obvious customers for GIS technology. If these persons use the tools of GIS, military missions can be better planned, including complete environmental considerations. Other potential installation users include Installations and Logistics (especially Master Planning), Operations and Training (for range siting), and others.

Objective 2. Develop or obtain databases needed to support MAGTFTC natural resources programs.

Objective 3. Provide appropriate databases to the Mojave Desert Ecosystem Program, other regional initiatives, and other potential users.

Objective 4. Attach tabular data to spatial data layers, such that a "point and click" provides such data on the spot.

Objective 5. Provide GIS to all pertinent NREA personnel.

Objective 6. Use analytical capabilities of the MAGTFTC GIS to provide natural resources management options.

Objective 7. Create user-friendly interfaces to enable a wider use of GIS databases specific to needs of installation users.

Objective 8. Routinely update/replace hardware and software to maintain the capability to use developing GIS technology.

7.3.1.3 Remotely Sensed Imagery

The oldest aerial imagery of the Combat Center were black and white photographs taken in 1952. The most recent (2001) are ½ meter, natural color imagery that is orthorectified from aerial photographs. One primary project using remote sensing imagery use at NREA is to track long-term trends in land use/disturbance on the Combat Center, as described in Section 4.9.1, *Training Land Monitoring*.

Objective 9. Use remote imagery for improved decision-making for military activities, natural resources support of military training, environmental management, and natural and cultural resources management and protection.

Objective 10. Obtain additional natural color, digital orthophotographs at ½-meter resolution every five years (the next in 2006).

7.3.2 Alternative 2 (No Action)

The Multiple Land Use Management Plan described steps needed to establish an effective data collection, storage, and analysis program at the Combat Center. These steps have been taken; thus, Alternative 2 is no longer viable.

7.3.3 Alternative 3 (Enhanced Stewardship)

Alternative 3 would be similar to the Preferred Alternative except that there would be additional requirements for data storage and analysis to support individual projects.

7.3.4 Other Options Eliminated

The option to neglect to upgrade hardware and software would reduce the quality of natural resources programs, and the installation would soon be technologically separate from its ecosystem management partners in the Mojave Desert as well as other military installations and commands. Additional expenditures could be made, but it is questionable whether they would significantly improve the quality of programs.

The MAGTFTC GIS database development is impressive considering the short time the program has been in place. Significant growth rate increases are probably not viable. There are many options in the rapidly evolving remote imagery field, ranging from no use of the technology to massive expenditures on data layers. Considering the requirement to maintain the quality of training lands and to comply with environmental laws, ignoring the use of remote imagery would ultimately require an even greater expenditure to monitor land conditions using more personnel-intensive methods.

7.4 Project/Program Summary

Projects, goals, and objectives within this INRMP can be used to monitor the effectiveness of natural resources management at the Combat Center. Section 7.5.2 contains a list of projects for budget purposes, and Appendix 7.4 contains a list of projects, goals, and objectives for this INRMP in the order they appear. Goals and objectives are abbreviated from chapters 4, 5, and 7.

7.5 Implementation Funding

Natural resources management relies on a variety of funding mechanisms. Below are general discussions about different sources of funding to implement this INRMP.

7.5.1 Funding Sources

7.5.1.1 Legacy Funds

The DoD Legacy Resources Management Program was instituted by Congress in 1991 to promote stewardship of natural and cultural resources. Legacy is controlled using special Legacy project proposal/reporting procedures. Legacy funds are generally for nonrecurring items that are neither routine operations nor compliance driven. They are normally used for lower priority type projects. Funding levels from Legacy are highly variable and are not reliable from year to year.

7.5.1.2 Agricultural Funds

Agricultural funds are derived from agricultural leases on installations. They are centrally managed at Marine Corps Headquarters with no requirements for spending where they were generated. They are primarily intended to offset costs of maintaining agricultural leases, but they are also available for preparing and implementing

INRMPs. These are the broadest use funds available exclusively to natural resources managers.

7.5.1.3 Operations and Maintenance Marine Corps Funds

Operations and Maintenance Marine Corps (OMMC) Funds are provided to the MAGTFTC Commander for base operations. Virtually any project or program within this INRMP can compete for these discretionary funds. Most of the NREA program is funded from this avenue. Funding from this source is critical to the success of INRMP implementation.

7.5.1.4 Headquarters Marine Corps Environmental Management Funds

Headquarters Marine Corps Environmental Management Funds are a special category of OMMC dollars. These funds are managed by Headquarters Marine Corps. They are special in that they are "fenced" by Defense, but they are still subject to the restrictions of OMMC funds. Compliance with laws is the key to getting Headquarters Marine Corps Environmental Management Funds. The program heavily favors high priority funding for projects that are out of compliance with federal or state laws, especially if noncompliances are backed by Notices of Violation or other enforcement agency actions.

"Must fund" classifications include mitigation identified within *Findings of No Significant Impact* and items required to comply with various federal laws and regulations. This INRMP identifies compliance and stewardship requirements mandated by federal laws, regulations, and policies, and some projects and programs within it are used to mitigate various military activities. The 1997 Sikes Act Improvement Act requires implementation of INRMPs, which make implementation of this INRMP a priority for funding.

7.5.2 INRMP Project Funding

Budget development and INRMP implementation are both continuing and interrelated processes. Natural resources funding requests should support INRMP planned actions and vice versa. While not all natural resources-related expenditures are identified within the INRMP (*e.g.*, staff, supplies, overhead funding), all planned actions within the INRMP that require funding should be incorporated into budget planning documentation (*e.g.*, Program Objectives Memorandum and biannual budgets). As budgets are re-evaluated and funding allocations change, so must INRMP planned actions, prioritization, and implementation years be adjusted, re-evaluated, and possibly reprioritized. The tracking and monitoring of progress toward INRMP goals and objectives and the adaptive management of resources will require revisions/reprioritizations of INRMP planned actions and corresponding budget requests.

The MAGTFTC will seek appropriate funding and will set priorities based on the amount of funds actually received. Class 1 and Class 2 projects within this INRMP are those actions that the MAGTFTC commits to implementing within the duration of the plan. Class 1 projects are those that must be done because the installation is out of compliance and therefore must be funded in the current fiscal year to correct the noncompliance situation or to remain in compliance in the current fiscal year. Class 2 projects are those that should be funded in order to remain in compliance within the deadlines given for compliance. Class 3 projects are those above compliance and not explicitly required by law but support natural resources management goals and objectives.

The Marine Corps budgetary process requires requests for funding as far as seven years in the future. Thus, MAGTFTC budgets for natural resources management throughout the 2002-2006 period are already in the

system. However, these budgets are periodically updated, so they are sufficiently flexible to meet emergent requirements and needs.

INRMP development provides MAGTFTC the opportunity to take a strategic look at its entire natural resources program and develop more integrated ways to organize its program. Thus, this INRMP is not completely compatible with previous funding requests and their associated projects. Future budgets will be more closely aligned with this INRMP.

The below table identifies projects within current budgets that are pertinent to implementation of this INRMP. Actual funding amounts, by project, are not included as they are confidential, due to the projected use of contracting for some of them..

MCAGCC Natural Resources Budget Requests

Project Number^	Project Title	Class	FY 02	FY 03	FY 04	FY 05	FY 06
TP8294NR19	Biological Opinion Mitigation Requirements	1	x	x	x	x	x
TP0222NR25	Population Trend Monitoring, Federally T&E Species	1	x	x	x	x	x
TP1155NR32	Reptile Baseline Inventory	1	x	x	x	x	
TP1172NR34	Rangeland Health Assessment for Tortoise Habitat	1		x			
TP14537	Desert Tortoise Management Plan	1				x	
TP29930	Wildlife Rehabilitation	1	x	x	x	x	x
TP7343NR01	Cleghorn Lakes Control Study	1	x	x	x	x	x
TP8294NR16	INRMP and INRMP Implementation	1	x	x	x	x	x
TP8294NR18	Invasive Exotic Plant Species Control	1	x	x	x	x	x
TP99742 / TP1945NR30	Desert Tortoise Mortality Sources / Necropsies	1	x	x	x	x	x
TP0222NR28	Monitor Bat Density/Diversity in Protected Mines	2	x	x	x	x	x
TP1155NR31	Geospatial Information and Services (GI&S)	2	x	x	x	x	x
TP1172NR35	Wildfire Management Plan	2	x				
TP1172NR36	Update Vegetation Map	2			x		
TP1175NR37	Range Training Area Educational Material	2	x		x		x
TP1175NR38	Canyon and Wash Locations and Conditions	2				x	
TP11940	Sensitive Plant Species Surveys / Monitoring	2	x	x			
TP66846	Land Condition Trend Analysis	2	x		x		x
TP88761	Aerial Photographic Support	2	x	x	x	x	x
TP0222NR26	Rare/Newly Listed Species Surveys-Chuckwalla	3		x			

TP0222NR27	Rare/Newly Listed Species Surveys- Pocket Mouse	3	x				
TP0222NR29	Bighorn Sheep Population Monitoring	3	x	x	x	x	x

^ Project numbers from existing budget.

Below are above projects summarized by funding class.

MCAGCC Natural Resources Budget Requests*

Fiscal Year	02	03	04	05	06
Total Class 1	$320	$365	$375	$445	$357.5
Total Class 2	$435	$305	$640	$325	$320
Total Class 3	$55	$65	$35	$35	$15
Total	$810	$735	$1,050	$805	$692.5

* Dollars in thousands.

Projects specifically for pest management, general NEPA, GIS/Remote Sensing requirements external to this INRMP, enforcement, and cultural resources management beyond what is described within this INRMP are not included in this listing. Funding for in-house salaries are also not within this project.

The cost to implement this INRMP is estimated at $4,092,500 for FY 02 - FY 06. Budgets will be adjusted as needed each year.

7.6 Command Support

Command support is essential to implementation of this Plan. Many priority projects for natural resources management within the next five years require command support. The Commanding General is personally liable for noncompliance with environmental laws, such as those affected by this INRMP. Thus, he has a personal interest in ensuring this Plan is properly implemented.

This Plan has the support of the MAGTF-TC Commander and other personnel in command positions who are needed to implement this INRMP. The Command is dedicated to implementation of this Plan as required by the Sikes Act Improvement Act and other Federal laws. The command is also dedicated to maintaining and improving the military mission at the Combat Center. Implementation of this Plan is a means to that end.

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8.0 Environmental Consequences

As discussed in Section 1.7.4 of this document, three alternatives are considered feasible:

- Alternative 1, the Preferred Alternative - full implementation of the INRMP;
- Alternative 2, the No Action Alternative - continued implementation of programs described in the Multiple Land Use Management Plan; and
- Alternative 3, the Enhanced Stewardship Alternative - implement projects that would enhance the stewardship of public lands, in addition to those proposed in Alternative 1 (this INRMP).

Therefore, the impact on various systems in affected environments will be assessed based on these three alternatives. Per guidelines for the preparation of environmental assessments, both alternatives to the Preferred Alternative are only briefly discussed for each project described in Chapters 4, 5, and 7 of this INRMP. The Preferred Alternative is described for projects in Chapters 4, 5, and 7 and summarized in Appendix 7.4 Below analyses are summaries of these more detailed analyses.

None of the three alternatives would have significant negative environmental consequences compared to existing conditions. The three alternatives differ in their ability to proactively manage natural resources, support the military mission, mitigate environmental disturbance due to the Combat Center mission, and comply with environmental laws.

The INRMP provides goals and objectives for managing natural resources, a course of action designed to significantly improve the management of MCAGCC natural resources. The INRMP allows flexibility in management options as more information becomes available from ongoing and planned studies.

8.1 Soils

8.1.1 Alternative 1 (Preferred)

The natural resources management program at the Combat Center has evolved significantly during the past decade due to experience gained from implementation of restoration projects, and the Combat Center proposes to take advantage of lessons learned during this process. The Preferred Alternative emphasizes the continued use of already disturbed lands to conserve lands used less intensively to the extent possible.

8.1.2 Alternative 2 (No Action)

Beneficial effects would be expected, but these would be less than with the Preferred Alternative. Alternative 2 would have similar consequences as the Preferred Alternative with regard to soil disturbance minimization, but it has a greater emphasis on land restoration. However, restoration experiences on the Combat Center over the past five years, combined with similar experiences elsewhere, indicate that land restoration is a high cost:low success option with regard to soil protection and restoration.

8.1.3 Alternative 3 (Enhanced Stewardship)

Beneficial effects would be expected. Since the direct management of soil resources is not an additional program under the Enhanced Stewardship Alternative, consequences of this alternative would be similar as with the Preferred Alternative.

8.2 Water Resources

Water resources conservation and management programs at the Combat Center are not within the purview of this INRMP. However, some aspects of this INRMP may indirectly affect water resources.

8.2.1 Alternative 1 (Preferred)

The Preferred Alternative would have no effect on surface water quantity and quality since these waters are totally determined on the basis of Mainside water treatment and storm water runoff. The Preferred Alternative would help recharge ground water to an unknown degree (negligible effect) due to the maintenance of vegetative cover in xeroriparian washes and other natural collection channels. This alternative would comply with provisions of the Clean Water Act.

8.2.2 Alternative 2 (No Action)

Alternative 2 would be similar to the Preferred Alternative (no effect) with regard to both surface and ground water. It might be somewhat less protective of ground water recharge sites due to a lack of a dedicated training land management/monitoring project but slightly more effective in restoring a very limited amount of disturbed lands, which could minimally increase ground water recharge (negligible effect).

8.2.3 Alternative 3 (Enhanced Stewardship)

Since the management of water resources is not an additional program under the Enhanced Stewardship Alternative, consequences of this alternative would be the same (no effect on surface water and negligible effect on ground water) as with the Preferred Alternative.

8.3 Biological Resources

8.3.1 Alternative 1 (Preferred)

Beneficial effects would be expected. The Preferred Alternative would provide management of faunal and floral resources at the Combat Center on an integrated basis. The INRMP uses an ecosystem management strategy to achieve biological diversity conservation, in accordance with the Department of Defense Biodiversity Initiative (The Keystone Center, 1996). It emphasizes the use of native species, as emphasized on the Presidential memorandum to the heads of federal agencies (Office of the President, 1994). The Preferred Alternative includes compliance with the Endangered Species Act and other laws pertaining to biological resources. This alternative emphasizes involvement with Mojave Desert partnerships with other agencies and organizations.

The Preferred Alternative includes specific actions to manage the Mojave Desert ecosystem, including wildlife

habitat conservation in areas not intensively used for military activities, wildlife population management, Mainside management, protection of special interest natural areas, integrated pest management, prevention and suppression of wildfires, monitoring ecosystem indicator and rare plants and animals, wet areas protection, wildlife guzzler maintenance, and minimization of disturbance to habitat by human activities. Implementation of NEPA under this INRMP would provide a methodology to help ensure compliance with laws, policies, and regulations affecting biological resources at the Combat Center.

8.3.2 Alternative 2 (No Action)

Beneficial effects would be expected, but to a lesser degree than with the Preferred Alternative. Alternative 2 would have similar consequences as the Preferred Alternative on biological resources. It could result in slightly greater restoration of disturbed habitat, but this would not likely be significant. There would be somewhat greater impacts to biological resources from military activities as this alternative does not include a program dedicated to support the long-term sustainability of the military mission, that involves disturbance minimization. The No Action Alternative would not begin the process of wildfire minimization and suppression.

8.3.3 Alternative 3 (Enhanced Stewardship)

Beneficial effects would be expected, to a greater degree than with the Preferred Alternative. The Enhanced Stewardship Alternative would have similar consequences as the Preferred Alternative on most biological resources. However, due to additional projects that involve biological resources (*i.e.*, enhanced tortoise disease monitoring, population assessments of bighorn sheep, assessments of State-listed species, habitat improvement at the former VSTOL site, desert tortoise cohort study, packrat midden study), benefits would be improved, particularly for the desert tortoise, bighorn sheep, and State-listed species. The degree of benefit enhancement is unknown.

8.4 Air Quality

This INRMP does not directly impact air quality on and near the Combat Center since the air quality program is not a natural resources program. However, natural resources programs that affect soil integrity could indirectly affect air quality.

8.4.1 Alternative 1 (Preferred)

Beneficial effects would be expected. The Preferred Alternative includes implementation of the training land monitoring/management project, which is designed to minimize disturbance to areas not being intensively used for military maneuvers or ordnance impacts. This, in turn, results in reduced dust generation. The Preferred Alternative will reduce the generation of fine dusts through the reduction of most unnecessary trails, and use of Predesignated Range Training Support Sites.

Implementation of this INRMP is exempt from conformity requirements of the Clean Air Act. A copy of the Record of Non-Applicability is in Appendix 8.4.1.

8.4.2 Alternative 2 (No Action)

Beneficial effects would be expected, but to a lesser degree than with the Preferred Alternative. Alternative 2 would affect the generation of dust in a similar fashion as the Preferred Alternative except to a somewhat lesser degree. This alternative does not include a dedicated training land monitoring/management project to sustain the military mission, which includes an emphasis on soil integrity protection in areas not being intensively used.

8.4.3 Alternative 3 (Enhanced Stewardship)

Since the management of air quality resources is not an additional program under the Enhanced Stewardship Alternative, consequences of this alternative would be the same (beneficial) as with the Preferred Alternative.

8.5 Cultural Resources

8.5.1 Alternative 1 (Preferred)

The proposed implementation of the INRMP would be beneficial to the protection of cultural resources. The Preferred Alternative includes steps to protect cultural resources sites from disturbance during implementation of this plan. Ground-disturbing natural resources projects in unsurveyed areas must have site-specific surveys prior to implementation. The review of projects by the Cultural Resources Manager and the NEPA process are used to ensure protection of known and potential cultural resources while implementing the INRMP. Implementation of the training land management project, particularly marking off-limits sites and reducing erosion hazards, is a benefit of the Preferred Alternative to archeological resources.

8.5.2 Alternative 2 (No Action)

Alternative 2 would have cultural resources consequences similar to the Preferred Alternative since most steps being taken are mandated by law or implementing regulations.

8.5.3 Alternative 3 (Enhanced Stewardship)

Beneficial effects would be expected, with a potential for somewhat greater benefits than with the Preferred Alternative.

8.6 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, directs federal agencies to identify and address disproportionately high and adverse human or environmental impacts of their program, policies, and activities on minority or low income populations in the surrounding community. The remote location of the Combat Center in relation to populated areas minimizes the potential for disproportionate impacts on minority or disadvantaged groups of people.

8.6.1 Alternative 1 (Preferred)

There is no evidence or suggestion that the Preferred Alternative would disproportionally affect any minority or disadvantaged group of people in the area.

8.6.2 Alternative 2 (No Action)

There is no evidence or suggestion that programs discussed in the Multiple Land Use Management Plan would disproportionally affect any minority or disadvantaged group of people in the area.

8.6.3 Alternative 3 (Enhanced Stewardship)

There is no evidence or suggestion that any Enhanced Stewardship projects discussed in this INRMP would disproportionally affect any minority or disadvantaged group of people in the area.

8.7 Protection of Children

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* (April 21, 1997) recognizes a growing body of scientific knowledge demonstrating that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because children's bodily systems are not fully developed; because they eat, drink, and breathe more in proportion to their body weight; because their size and weight may diminish protection from standard safety features; and because their behavior patterns may make them more susceptible to accidents.

The President directed each federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health or safety risks.

8.7.1 Alternative 1 (Preferred)

The Preferred Alternative would not have a disproportionate environmental health risk or safety risk to children.

8.7.2 Alternative 2 (No Action)

The No Action Alternative would not have a disproportionate environmental health risk or safety risk to children.

8.7.3 Alternative 3 (Enhanced Stewardship)

The Enhanced Stewardship Alternative would not have a disproportionate environmental health risk or safety risk to children.

8.8 Cumulative Impacts

Cumulative impacts result from the incremental impact of actions when they are combined with other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions (40 Code of Federal Regulations 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

8.8.1 Alternative 1 (Preferred)

Beneficial effects would be expected on soil and air quality. There are no anticipated negative impacts to soil resources beyond the insignificant amount of impacts from off-road driving of light vehicles to accomplish tasks within this INRMP. Dust and air emissions from vehicle driving would be insignificant. The Preferred Alternative would protect soils to the greatest extent possible and still allow the completion of the current mission, minimizing the potential for cumulative effects.

There are no known significant effects of implementation of this INRMP to water resources, either long- or short-term. Thus, there are no significant cumulative impacts.

Beneficial effects would be expected on biological resources. Most projects within the INRMP are designed to protect or enhance these resources, emphasizing requirements of the Endangered Species Act. The monitoring of biological resources (particularly through the training land monitoring project) is a major program within the Preferred Alternative that would provide quantitative data regarding cumulative impacts to vegetative resources at the Combat Center. Monitoring programs would be used to adjust biological resources protection and management programs to meet program objectives (adaptive management).

The Preferred Alternative has minimal potential for accidental irreversible or irretrievable commitment of cultural resources, either by significant single actions or cumulative actions. This potential would be significantly reduced with implementation of the Integrated Cultural Resources Management Plan.

There are no known cumulative impacts within areas of Environmental Justice or Protection of Children.

8.8.2 Alternative 2 (No Action)

Cumulative impacts under Alternative 2 would be similar to those of the Preferred Alternative, but the emphasis on land restoration under the No Action Alternative could slightly increase long-term benefits from site-specific habitat restoration in a few areas. Conversely, the lack of a dedicated training land monitoring/management project in the No Action Alternative would reduce long-term disturbance to soil, air, and biological resources at the Combat Center. Cumulative effects on cultural resources under this alternative would be similar to those of the Preferred Alternative. There are no known cumulative impacts within areas of Environmental Justice or Protection of Children.

8.8.3 Alternative 3 (Enhanced Stewardship)

Cumulative impacts under Alternative 3 would be similar to those of the Preferred Alternative, but long-term benefits from most projects that would be implemented under the Enhanced Stewardship Alternative would provide additional long-term benefits to certain biological resources, specifically the desert tortoise, bighorn

sheep, and State-listed species. There are no known negative cumulative impacts to soil, water, air, or biological resources under Alternative 3. Cumulative effects on cultural resources under this alternative would be similar to those of the Preferred Alternative. There are no known cumulative impacts within areas of Environmental Justice or Protection of Children.

8.9 Summary of Consequences

Below is a summary of above discussions of environmental consequences of the three alternatives.

Environmental Resource/ Program	1. Preferred	2. No Action	3. Enhanced Stewardship
Soil Resources	Beneficial	Less Beneficial	Beneficial
Surface Water	No Effect	No Effect	No Effect
Ground Water	Negligible	Negligible	Negligible
Biological Resources	Beneficial	Less Beneficial	More Beneficial
Air Quality	Beneficial	Less Beneficial	Beneficial
Cultural Resources	Beneficial	Beneficial	Beneficial
Environmental Justice	No Effect	No Effect	No Effect
Protection of Children	No Effect	No Effect	No Effect

* No Effect: Actions have no known demonstrated impacts
Negligible: Impact is not measurable or perceptible
Beneficial: Actions have apparent beneficial effects
Negative: Actions have apparent negative effects
(Note: The terms "less" or "more" may be added to the terms "beneficial" or "negative" for comparison purposes between alternatives.)

8.10 Conclusions

The proposed action to implement the INRMP for MAGTFTC was analyzed by comparing potential environmental consequences against existing conditions. Findings indicate that, under the Preferred Alternative, potential consequences would result in either no significant adverse effects or beneficial effects on each resource area. The affected environment would not be significantly or adversely impacted by proceeding with the Preferred Alternative. Additionally, no significant cumulative effects would be expected.

Based on this environmental assessment, implementation of the Preferred Alternative (full implementation of this INRMP) would have no significant environmental or socioeconomic effects. Because no significant effects would result from implementation of the Preferred Alternative, the preparation of an environmental impact statement is not required, and preparation of a Finding of No Significant Impact is appropriate.

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
BLM	Bureau of Land Management
CAX	Combined Arms Exercise
CCO	Combat Center Order
CDFG	California Department of Fish and Game
CERL	Construction Engineering Research Laboratory
CFR	Code of Federal Regulations
CG	Commanding General
CNPS	California Native Plant Society
DESFIREX	Desert Fire Exercise
DoD	Department of Defense
EAF	Expeditionary Air Field
ECE	Environmental Compliance Evaluation
EOD	Explosives Ordnance Disposal
F	Fahrenheit
FINEX	Final Exercise
FMD	Facilities Maintenance Division
FSCEX	Fire Support Coordination Exercise
GIS	geographic information system
ha	hectares
INRMP	Integrated Natural Resources Management Plan
IPA	Intergovernmental Personnel Act
km	kilometers
LCTA	Land Condition Trend Analysis
LtCol	Lieutenant Colonel
MAJ	Major
MCAGCC	Marine Corps Air Ground Combat Center
MCEES	Marine Corps Communications-Electronics School
MCO	Marine Corps Order
MDEP	Mojave Desert Ecosystem Program
MOUT	Military Operations in Urban Terrain
MPRC	Multi-Purpose Range Complex
mph	miles per hour
NAGPRA	Native American Graves Protection and Repatriation Act
NAVFACENGCOM	Naval Facilities Engineering Command
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NREA	Natural Resources and Environmental Affairs Division
NRHP	National Register of Historic Places
O&T	Operations and Training Directorate
OMMC	Operations and Maintenance Marine Corps
ORV	off-road vehicle
ORISE	Oak Ridge Institute of Science and Education

PACIDERM	Planning And Coordination of Interagency Desert Environmental Resources Managers
PLO	Public Land Order
PMO	Provost Marshal Office
RTAA	Range Training Area and Airspace
SHPO	State Historic Preservation Office
U.S.	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
USMC	United States Marine Corps
WES	Waterways Experiment Station

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AND ENVIRONMENTAL ASSESSMENT

MARINE CORPS AIR GROUND COMBAT CENTER TWENTYNINE PALMS, CALIFORNIA

APPENDICES

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APPENDIX 2.3.1.1: Items of Cooperation Among the U.S. Fish and Wildlife Service, California Department of Fish and Game, and Marine Air Ground Task Force Training Command, Twentynine Palms, California

PURPOSE: The purpose of this document is to specifically list items to be provided by the California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service (USFWS), and the Marine Air Ground Task Force Training Command, Twentynine Palms (MAGTFTC) for cooperative implementation of the MAGTFTC Integrated Natural Resources Management Plan (INRMP). Items not specifically listed will generally be the responsibility of MAGTFTC unless the other agencies agree to assist with their implementation.

AUTHORITY:

In accordance with the authority contained in Title 10, U.S. Code, Section 2671 and Title 16, U.S. Code, Section 670a *et seq.*, as amended, the Department of Defense, the Department of Interior, and the State of California, through their duly designated representatives whose signatures appear on the MAGTFTC INRMP, specifically endorse the INRMP and the below specific items of cooperation among the three agencies.

The INRMP includes National Environmental Policy Act documentation in the form of an Environmental Assessment.

RESPONSIBILITIES:

The Commanding General, MAGTFTC has jurisdiction over the Combat Center and has trusteeship responsibility to restore, conserve, and protect natural resources on the base. The USFWS is the agency of the Federal Government primarily responsible for welfare of fish and wildlife species with specific responsibilities for management of migratory birds and protection of threatened or endangered species. The CDFG was created under the laws of the State of California to provide protection and regulation of resident fish and wildlife in California.

These three agencies agree that it is in the best interests of MAGTFTC, the USFWS, and the CDFG to mutually work with the common purpose of managing natural resources at the Combat Center. These efforts include both stewardship and regulatory compliance requirements for the installation.

MUTUAL AGREEMENT:

- The USFWS and CDFG shall act in an advisory capacity to MAGTFTC in matters pertaining to management of natural resources on the installation.
- The USFWS and CDFG shall furnish technical assistance for development and implementation of professionally sound natural resources programs on the Combat Center, provided funding for such support is available.
- MAGTFTC shall have primary responsibility for implementation of this INRMP.
- All parties will meet as required to discuss matters relating to implementation of this INRMP. Unless

there are scheduling problems, these meetings will be jointly attended by the three parties.

- No exotic species of fish or wildlife will be introduced on the Combat Center without prior written approval by MAGTFTC, the USFWS, and the CDFG.
- Representatives of the USFWS and CDFG will be admitted to the installation at reasonable times, subject to requirements of military necessity and security.
- MAGTFTC shall furnish assistance and facilities to the CDFG and/or USFWS for mutually agreed upon natural resources research projects.
- Hunting and fishing are currently prohibited on the Combat Center due to the absence of game fish and the nature of the military mission.
- Public access is denied. Security and safety are matters of significant concern. It is noted that there has been little demand for public access for hunting.
- MAGTFTC agrees to cooperate with the USFWS and CDFG for management of threatened or endangered species residing on the installation. Such efforts will be in compliance with USFWS and State laws and applicable U.S. Marine Corps regulations. More specifically, MAGTFTC will inventory its use by threatened or endangered species and complete and implement a management plan for these species if required.
- The USFWS and CDFG agree to provide assistance with enforcement of laws relating to wildlife resources on the Combat Center. Such assistance will be coordinated with MAGTFTC and shall normally be at the request of the installation.
- MAGTFTC has the option to directly transfer funds to the CDFG and USFWS for implementation of this INRMP, in accordance with provisions within the Sikes Act.
- It is understood that implementation of this INRMP requires certain latitude with regard to professional decisions. However, MAGTFTC agrees that any changes that significantly impacts natural resources must include modification of this INRMP in addition to any other environmental compliance requirements.

LIMITATIONS: The military mission of MAGTFTC supersedes natural resources management and associated recreational activities, and such activities must be compatible with the military mission. However, where there is conflict between the military mission and provisions of the Endangered Species Act, the Sikes Act, or any other law associated with natural resources conservation, such conflicts will be resolved according to statutory requirements.

REQUIRED REFERENCES:

- Nothing contained in this agreement shall modify any rights granted by treaty to any Native American tribe or to members thereof.
- The possession of a special permit for hunting migratory game birds will not relieve the permittees of the requirements of the Migratory Bird Treaty Act, as amended.
- As required by the Sikes Act, the following agreements are made:

(1) This MAGTFTC INRMP is the planning document required by the Sikes Act, as amended. This Plan contains those items specifically required by law. In the event the Sikes Act is amended after this INRMP is signed, this plan will be amended to conform with the new requirements within the Sikes Act, if needed.

(2) This plan will be reviewed by the CDFG, USFWS, and the MAGTFTC on a regular basis, but not less often than every five years.

(3) No land or forest products from MCAGCC will be sold under Section 2665 (a) or (b), Title 10 USC,

and no land will be leased on MCAGCC under Section 2667 of such Title 10 unless the effects of such sales or leases are compatible with the purposes of the INRMP.

(4) With regard to implementation and enforcement of the MAGTFTC INRMP, neither Office of Management and Budget Circular A-76 nor any successor circular thereto applies to the procurement of services that are necessary for that implementation and enforcement, and priority shall be given to the entering into of contracts for the procurement of such implementation and enforcement services with Federal and State agencies having responsibility for the conservation or management of fish or wildlife.

(5) The MAGTFTC INRMP is not, nor will be treated as, a cooperative agreement to which Chapter 63, Title 31, United States Code applies.

(6) This INRMP will become effective upon the date subscribed by the last signature and shall continue in full force for a period of five years or until terminated by written notice to the other parties by any of the parties signing this agreement. This agreement may be amended or revised by agreement between the parties hereto. Action to amend or revise may originate with any of the other participating agencies.

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APPENDIX 3.13: Fauna Known or Suspected at MAGTFTC

Mammals		
Scientific Name	**Common Name**	**Comments**
Notiosorex crawfordi	desert shrew	***hypothetical*** - could be rare and widespread
Macrotus californicus	California leaf-nosed bat	***hypothetical*** - could be rare to uncommon and widespread
Myotis yumanensis	Yuma myotis	***hypothetical*** - could be rare to uncommon and widespread
Myotis thysanodes	fringed myotis	***hypothetical***- could be casual to rare and widespread
Myotis volans	long-legged myotis	***hypothetical*** - could be casual to rare and widespread
Myotis californicus	California myotis	fairly common to common and widespread
Myotis ciliolabrum	small-footed myotis	***hypothetical*** - could be rare to uncommon and widespread
Pipistrelles hesperus	western pipestrelle	common and widespread
Eptesicus fuscus	big brown bat	uncommon to fairly common and widespread
Lasiurus blossevillii	western red bat	***hypothetical*** - could be casual to rare and not widespread
Lasiurus cinereus	hoary bat	rare to uncommon and may be widespread
Lasiurus xanthinus	western yellow bat	***hypothetical*** - could be casual to rare and not widespread
Euderma maculatum	spotted bat	***hypothetical*** - probably rare and not widespread
Plecotus townsendii	Townsend's (western) big-eared bat	fairly common and widespread
Idionycteris phyllotis	Allen's big-eared bat	***hypothetical*** - could be casual to rare and not widespread
Antrozous pallidus	pallid bat	uncommon to common and widespread
Tadarida brasiliensis	Mexican free-tailed bat	uncommon to fairly common and widespread
Nyctinomops femorosaccus	pocketed free-tailed bat	***hypothetical*** - could be rare and not widespread
Nyctinomops macrotis	big free-tailed bat	***hypothetical*** - could be casual to rare and widespread

Eumops perotis	western mastiff bat	uncommon to fairly common and widespread
Procyon lotor	common raccoon	casual to rare and very restricted
Bassariscus astutus	ringtail	***hypothetical*** - could be rare and not widespread
Taxidea taxus	American badger	uncommon to fairly common and widespread
Mephitis mephitis	striped skunk	casual to rare and not widespread
Canis familiaris	feral dog	uncommon to fairly common and not widespread
Canis latrans	coyote	uncommon to common and widespread
Vulpes velox (macrotis)	kit fox	uncommon to common and widespread
Urocyon cinereoargenteus	common gray fox	rare to uncommon and possibly widespread
Puma concolor	mountain lion	***hypothetical*** - may be casual and widespread
Lynx rufus	bobcat	uncommon to fairly common and widespread
Felis catus	domestic cat	casual and not widespread
Spermophilus tereticaudus	round-tailed ground squirrel	uncommon to common and widespread
Spermophilus beecheyi	California ground squirrel	casual to rare and not widespread
Ammospermophilus leucurus	white-tailed antelope ground squirrel	common and widespread
Thomomys bottae	valley (Botta's) pocket gopher	fairly common to abundant and widespread
Perognathus longimembris	little pocket mouse	fairly common to common and widespread
Chaetodipus penicillatus	desert pocket mouse	rare to uncommon and not widespread
Chaetodipus fallax pallidus	pallid San Diego pocket mouse	casual to uncommon and not widespread
Chaetodipus formosus	long-tailed pocket mouse	common and widespread
Dipodomys deserti	desert kangaroo rat	common and widespread *
Dipodomys merriami	Merriam's kangaroo rat	common to abundant and widespread *
Peromyscus eremicus	cactus mouse	fairly common to common and widespread
Peromyscus crinitus	canyon mouse	fairly common to abundant and widespread
Peromyscus maniculatus	deer mouse	***hypothetical*** - could be rare and not widespread
Onychomys torridus	southern grasshopper mouse	uncommon to fairly common and widespread
Neotoma lepida	desert woodrat	fairly common to common and widespread

Mus musculus	house mouse	***hypothetical*** - may be common but not widespread
Lepus californicus	black-tailed jackrabbit	uncommon to abundant and widespread
Sylvilagus audubonii	desert cottontail	rare to fairly common and not widespread
Ovis canadensis nelsoni	Nelson bighorn sheep	uncommon to fairly common and widespread
Birds		
Scientific Name	**Common Name**	**Comments**
Aechmophorus occidentalis	Western Grebe	migratory
Podiceps grisegena	Red-necked Grebe	migratory
Podiceps nigricollis	Eared Grebe	year-round, probable nester
Podilymbus podiceps	Pied-billed Grebe	migratory
Pelecanus erythrorhynchos	American White Pelican	migratory
Phalacrocorax auritus	Double-crested Cormorant	migratory
Butorides striatus	Green Heron	migratory
Bubulcus ibis	Cattle Egret	migratory
Casmerodius albus	Great Egret	migratory
Egretta thula	Snowy Egret	migratory
Ardea herodias	Great Blue Heron	migratory
Plegadis chihi	White-faced Ibis	migratory
Cygnus columbianus	Tundra Swan	migratory
Anser albifrons	Greater White-fronted Goose	winter
Chen caerulescens	Snow Goose	winter
Chen rossii	Ross' Goose	winter
Branta canadensis	Canada Goose	winter
Anas platyrhynchos	Mallard	year-round, confirmed nester
Anas strepera	Gadwall	migratory
Anas crecca	Green-winged Teal	migratory
Anas americana	American Wigeon	winter
Anas acuta	Northern Pintail	migratory

Anas clypeata	Northern Shoveler	year-round, probable nester
Anas discors	Blue-winged Teal	migratory
Anas cyanoptera	Cinnamon Teal	migratory
Oxyura jamaicensis	Ruddy Duck	year-round, probable nester
Aythya valisineria	Canvasback	migratory
Aythya americana	Redhead	winter
Aythya collaris	Ring-necked Duck	winter
Aythya marila	Greater Scaup	migratory
Aythya affinis	Lesser Scaup	migratory
Clangula hyemalis	Oldsquaw	migratory
Bucephala albeola	Bufflehead	migratory
Mergus merganser	Common Merganser	migratory
Porzana carolina	Sora	year-round, probable nester
Fulica americana	American Coot	year-round, confirmed nester
Recurvirostra americana	American Avocet	year-round, confirmed nester
Himantopus mexicanus	Black-necked Stilt	summer, confirmed nester
Charadrius alexandrinus	Snowy Plover	migratory
Charadrius semipalmatus	Semipalmated Plover	migratory
Charadrius vociferus	Killdeer	year-round, confirmed nester
Pluvialis squatarola	Black-bellied Plover	migratory
Limosa fedoa	Marbled Godwit	migratory
Numenius americanus	Long-billed Curlew	migratory
Catoptrophorus semipalmatus	Willet	migratory
Tringa melanoleuca	Greater Yellowlegs	migratory
Tringa flavipes	Lesser Yellowlegs	migratory
Tringa solitaria	Solitary Sandpiper	winter
Actitis macularia	Spotted Sandpiper	migratory
Phalaropus tricolor	Wilson's Phalarope	migratory
Phalaropus lobatus	Red-necked Phalarope	migratory

Phalaropus fulicaria	Red Phalarope	migratory
Limnodromus griseus	Short-billed Dowitcher	migratory
Limnodromus scolopaceus	Long-billed Dowitcher	migratory
Gallinago gallinago	Common Snipe	migratory
Calidris alpina	Dunlin	migratory
Calidris pusilla	Semipalmated Sandpiper	migratory
Calidris mauri	Western Sandpiper	migratory
Calidris minutilla	Least Sandpiper	winter
Calidris melanotos	Pectoral Sandpiper	migratory
Larus pipixcan	Franklin's Gull	migratory
Larus philadelphia	Bonaparte's Gull	migratory
Larus delawarensis	Ring-billed Gull	migratory
Larus canus	Mew Gull	migratory
Larus argentatus	Herring Gull	migratory
Larus californicus	California Gull	migratory
Larus occidentalis	Western Gull	migratory
Sterna forsteri	Forster's Tern	migratory
Chlidonias niger	Black Tern	migratory
Sterna caspia	Caspian Tern	migratory
Cathartes aura	Turkey Vulture	migratory
Aquila chrysaetos	Golden Eagle	year-round, probable nester
Circus cyaneus	Northern Harrier	winter
Accipiter striatus	Sharp-shinned Hawk	winter
Accipiter cooperii	Cooper's Hawk	winter
Buteo lineatus	Red-shouldered Hawk	migratory
Buteo jamaicensis	Red-tailed Hawk	year-round, confirmed nester
Buteo regalis	Ferruginous Hawk	migratory
Pandion haliaetus	Osprey	migratory
Falco sparverius	American Kestrel	year-round, confirmed nester

Falco columbarius	Merlin	migratory
Falco mexicanus	Prairie Falcon	year-round, confirmed nester
Falco peregrinus	Peregrine Falcon	migratory
Callipepla gambelii	Gambel's Quail	year-round, confirmed nester
Columba livia	Rock Dove	year-round, probable nester
Zenaida macroura	Mourning Dove	year-round, confirmed nester
Zenaida asiatica	White-winged Dove	summer, probable nester
Columbina inca	Inca Dove	migratory
Geococcyx californianus	Greater Roadrunner	year-round, confirmed nester
Tyto alba	Barn Owl	year-round, probable nester
Asio flammeus	Short-eared Owl	migratory
Asio otus	Long-eared Owl	winter
Bubo virginianus	Great horned Owl	year-round, confirmed nester
Athene cunicularia	Burrowing Owl	year-round, probable nester
Phalaenoptilus nuttallii	Common Poorwill	summer, probable nester
Chordeiles acutipennis	Lesser Nighthawk	summer, probable nester
Chaetura vauxi	Vaux's Swift	migratory
Aeronautes saxatalis	White-throated Swift	year-round, probable nester
Archilochus alexandri	Black-chinned Hummingbird	migratory
Calypte costae	Costa's Hummingbird	year-round, confirmed nester
Calypte anna	Anna's Hummingbird	year-round, confirmed nester
Selasphorus rufus	Rufous Hummingbird	migratory
Selasphorus sasin	Allen's Hummingbird	migratory
Ceryle alcyon	Belted Kingfisher	migratory
Colaptes auratus	Northern Flicker	winter
Colaptes chrysoides	Gilded Flicker	migratory
Melanerpes lewis	Lewis' Woodpecker	migratory
Sphyrapicus varius	Yellow-bellied Sapsucker	migratory
Sphyrapicus nuchalis	Red-naped Sapsucker	migratory

Picoides scalaris	Ladder-backed Woodpecker	year-round, confirmed nester
Tyrannus verticalis	Western Kingbird	summer, confirmed nester
Tyrannus vociferans	Cassin's Kingbird	migratory
Tyrannus forficatus	Scissor-tailed Flycatcher	migratory
Myiarchus tyrannulus	Brown-crested Flycatcher	migratory
Myiarchus cinerascens	Ash-throated Flycatcher	summer, confirmed nester
Contopus borealis	Olive-sided Flycatcher	migratory
Contopus sordidulus	Western Wood-pewee	migratory
Sayornis nigricans	Black Phoebe	year-round, probable nester
Sayornis saya	Say's Phoebe	year-round, confirmed nester
Empidonax wrightii	Gray Flycatcher	migratory
Empidonax oberholseri	Dusky Flycatcher	migratory
Empidonax hammondii	Hammond's Flycatcher	migratory
Empidonax traillii	Willow Flycatcher	migratory
Empidonax difficilis	Pacific-slope Flycatcher	migratory
Empidonax difficilis or *occidentalis*	Western Flycatcher	migratory
Eremophila alpestris	Horned Lark	year-round, confirmed nester
Tachycineta bicolor	Tree Swallow	migratory
Tachycineta thalassina	Violet-green Swallow	migratory
Riparia riparia	Bank Swallow	migratory
Stelgidopteryx serripennis	Northern Rough-winged Swallow	migratory
Hirundo pyrrhonota	Cliff Swallow	summer, probable nester
Hirundo rustica	Barn Swallow	migratory
Aphelocoma californica	Western Scrub Jay	migratory
Corvus brachyrhynchos	American Crow	migratory
Corvus corax	Common Raven	year-round, confirmed nester
Auriparus flaviceps	Verdin	year-round, confirmed nester
Sitta carolinensis	White-breasted Nuthatch	migratory
Sitta canadensis	Red-breasted Nuthatch	migratory

Troglodytes aedon	House Wren	migratory
Thryomanes bewickii	Bewick's Wren	migratory
Cistothorus palustris	Marsh Wren	year-round, probable nester
Catherpes mexicanus	Canyon Wren	year-round, probable nester
Salpinctes obsoletus	Rock Wren	year-round, confirmed nester
Campylorhynchus brunneicapillus	Cactus Wren	year-round, confirmed nester
Regulus calendula	Ruby-crowned Kinglet	winter
Polioptila caerulea	Blue-gray Gnatcatcher	migratory
Polioptila melanura	Black-tailed Gnatcatcher	year-round, confirmed nester
Sialia currucoides	Mountain Bluebird	winter
Catharus ustulatus	Swainson's Thrush	migratory
Catharus guttatus	Hermit Thrush	migratory
Turdus migratorius	American Robin	winter
Lanius ludovicianus	Loggerhead Shrike	year-round, confirmed nester
Mimus polyglottos	Northern Mockingbird	year-round, confirmed nester
Oreoscoptes montanus	Sage Thrasher	migratory
Toxostoma lecontei	LeConte's Thrasher	year-round, confirmed nester
Toxostoma redivivu	California Thrasher	migratory, confirmed nester
Anthus rubescens	American Pipit	winter
Anthus spragueii	Sprague's Pipit	migratory
Bombycilla cedrorum	Cedar Waxwing	migratory
Phainopepla nitens	Phainopepla	year-round, confirmed nester
Sturnus vulgaris	European Starling	year-round, confirmed nester
Vireo flavifrons	Yellow-throated Vireo	migratory
Vireo Bellii	Bell's Vireo	migratory
Vireo solitarius	Solitary Vireo	migratory
Vireo gilvus	Warbling Vireo	migratory
Vermivora celata	Orange-crowned Warbler	migratory
Vermivora ruficapilla	Nashville Warbler	migratory

Dendroica pennsylvanica	Chestnut-sided Warbler	migratory
Dendroica coronata	Yellow-rumped Warbler	year-round, probable nester
Dendroica nigrescens	Black-throated Gray Warbler	migratory
Dendroica townsendii	Townsend's Warbler	migratory
Dendroica occidentalis	Hermit Warbler	migratory
Dendroica petechia	Yellow Warbler	migratory
Oporornis tolmiei	MacGillivray's Warbler	migratory
Wilsonia pusilla	Wilson's Warbler	migratory
Seiurus noveboracensis	Northern Waterthrush	migratory
Geothlypis trichas	Common Yellowthroat	year-round, confirmed nester
Setophaga ruticilla	American Redstart	migratory
Pheucticus ludovicianus	Rose-breasted Grosbeak	migratory
Pheucticus melanocephalus	Black-headed Grosbeak	migratory
Passerina amoena	Lazuli Bunting	migratory
Pipilo chlorurus	Green-tailed Towhee	migratory
Pipilo maculatus	Spotted Towhee	migratory
Pooecetes gramineus	Vesper Sparrow	migratory
Passerculus sandwichensis	Savannah Sparrow	winter
Melospiza melodia	Song Sparrow	migratory
Chondestes grammacus	Lark Sparrow	migratory
Amphispiza bilineata	Black-throated Sparrow	year-round, confirmed nester
Amphispiza belli	Sage Sparrow	year-round, confirmed nester
Spizella passerina	Chipping Sparrow	migratory
Spizella breweri	Brewer's Sparrow	year-round, confirmed nester
Junco hyemalis	Dark-eyed Junco	winter
Zonotrichia leucophrys	White-crowned Sparrow	winter
Melospiza lincolnii	Lincoln's Sparrow	winter
Sturnella neglecta	Western Meadowlark	winter
Xanthocephalus xanthocephalus	Yellow-headed Blackbird	migratory, confirmed nester

Agelaius phoeniceus	Red-winged Blackbird	winter
Euphagus cyanocephalus	Brewer's Blackbird	migratory, probable nester
Molothrus ater	Brown-headed Cowbird	year-round, probable nester
Quiscalus mexicanus	Great-tailed Grackle	migratory, confirmed nester
Icterus parisorum	Scott's Oriole	year-round, confirmed nester
Icterus bullockii	Bullock's Oriole	migratory, confirmed nester
Icterus cucullatus	Hooded Oriole	migratory, confirmed nester
Piranga ludoviciana	Western Tanager	migratory
Passer domesticus	House Sparrow	year-round, confirmed nester
Carduelis psaltria	Lesser Goldfinch	year-round, confirmed nester
Carduelis lawrencei	Lawrence's Goldfinch	migratory
Loxia curvirostra	Red Crossbill	winter
Carpodacus mexicanus	House Finch	year-round, confirmed nester

Fish

Scientific Name	Common Name	Comments
Gambusia affinis	mosquitofish	introduced; occurs in some ponds

Amphibians

Scientific Name	Common Name	Comments
Bufo boreas	western toad	rare and restricted to golf course ponds
Bufo punctatus	red-spotted toad	uncommon, but possibly widespread
Hyla cadaverina	California treefrog	***hypothetical*** - may have been present prior to the drying of Surprise Spring
Hyla regilla	Pacific treefrog	***hypothetical*** - may have been present prior to the drying of Surprise Spring
Rana catesbiana	bullfrog	***hypothetical*** - may be rare to common and not widespread

Reptiles

Scientific Name	Common Name	Comments
Gopherus agassizii	desert tortoise	common and widespread
Coleonyx variegatus	western banded gecko	uncommon to fairly common and widespread

Eumeces gilberti	Gilbert skink	***hypothetical*** - not likely but could be rare and not widespread
Xantusia vigilis	desert night lizard	rare to uncommon and widespread, but restricted
Cnemidophorus tigris	western whiptail	common to abundant and widespread
Dipsosaurus dorsalis	desert iguana	fairly common to common and widespread
Sauromalus obesus	common chuckwalla	common and widespread
Crotaphytus insularis	desert collared lizard	fairly common to common and widespread
Gambelia wislizenii	long-nosed leopard lizard	common and widespread
Uta stansburiana	side-blotched lizard	abundant and widespread
Urosaurus graciosus	long-tailed brush lizard	uncommon to common and widespread
Sceloporus magister	desert spiny lizard	common and widespread
Phrynosoma platyrhinos	desert horned lizard	uncommon to common and widespread
Callisaurus draconoides	zebra-tailed lizard	common to abundant and widespread
Uma scoparia	Mojave fringe-toed lizard	fairly common to common and widespread
Leptotyphlops humilis	western blind snake	***hypothetical*** - rare to uncommon and widespread
Diadophis punctatus	ringneck snake	***hypothetical*** - rare and not widespread
Lichanura trivirgata	rosy boa	rare to uncommon and probably widespread
Rhinocheilus lecontei	long-nosed snake	uncommon to fairly common and probably widespread
Phyllorhynchus decurtatus	spotted leaf-nosed snake	uncommon to fairly common and widespread
Sonora semiannulata	ground snake	***hypothetical*** - could be uncommon and widespread
Chionactis occipitalis	western shovel-nosed (sand) snake	fairly common to common and widespread
Tantilla hobartsmithi	southwestern black-headed snake	***hypothetical*** - could be uncommon and widespread
Hypsiglena torquata	night snake	***hypothetical*** - may be uncommon to fairly common and widespread
Trimorphodon biscutatus	lyre snake	***hypothetical*** - could be uncommon to fairly common and widespread
Lampropeltis getulus	common (California) kingsnake	uncommon and possibly widespread

Arizona elegans	glossy snake	uncommon to common and widespread
Pituophis melanoleucus	gopher snake	uncommon to common and widespread
Masticophis flagellum	red coachwhip (red racer)	uncommon to fairly common and widespread
Salvadora hexalepis	western patch-nosed snake	fairly common to common and widespread
Crotalus atrox	western diamondback rattlesnake	***hypothetical*** - could be rare to uncommon and not widespread
Crotalus scutulatus	Mojave rattlesnake	uncommon to common and widespread
Crotalus viridus	western rattlesnake	***hypothetical*** - may be rare to uncommon and widespread
Crotalus mitchellii	speckled rattlesnake	uncommon to common and widespread
Crotalus cerastes	sidewinder	common to abundant and widespread

Sources - University of California, Riverside (1993), Brown-Berry (1994), Cutler *et al.* (1999)

* - Not a listed species and dissimilar in appearance to listed kangaroo rats

APPENDIX 4.12: Wildfire Management Plan, Marine Air Ground Task Force Training Command

This Wildfire Management Plan is an integral part of the Marine Air Ground Task Force Training Command, Twentynine Palms, California (MAGTFTC) Integrated Natural Resources Management Plan (INRMP). It is not intended to be a separate document. Descriptions of responsibilities, military mission, and physical and ecological environments at MCAGCC within INRMP chapters 2-3 are important parts of this Wildfire Management Plan.

1.0 Purpose. The purpose of this Wildfire Management Plan is to minimize wildfire occurrence aboard MCAGCC, minimize impacts of wildfires on military activities, and ecosystem damage.

2.0 Scope

2.1 Geography. This Wildfire Management Plan is developed specifically for implementation within MCAGCC boundaries and will require cooperation with neighboring landowners, with possible wildfire suppression activities conducted jointly to prevent the spread of fire on or off base boundaries.

2.2 Strategic. This Wildfire Management Plan is developed to specifically respond to issues related to wildfire prevention and suppression. As described in Section 3.0, *Background*, the reason wildfires are becoming more of a threat to MAGTFTC activities and natural resources is a rapidly advancing invasion of exotic annual grasses, that increase wildfire fuel loads. However, with exception of removal of vegetation as a potential means to prevent or minimize the spread of wildfires, this Wildfire Management Plan does not include treatment or control of exotic annual grasses.

3.0 Background

Most of the Mojave Desert ecosystem evolved in the absence of significant wildfires. Under natural conditions, wide plant spacing and the scarcity of native grasses are natural barriers to the spread of fire.

Since the 1970s, nonnative, annual grasses in the genera *Bromus* and *Schismus* have become increasingly dominate in the Mojave Desert. Unlike most native plants, that specialize in particular microhabitats, these grasses grow in many different situations and can create continuous fuel loads across the landscape. Unlike native annuals, that crumble and blow away soon after they die, dried remains of these nonnative grasses stay rooted in highly flammable, dense stands for years. Adding significantly to the issue is increasing human use of the Mojave Desert, that increases opportunities for fires to start. Compounding the issue is that once occurring, fires further encourage the spread of nonnative, annual grasses, further increasing fire risks in terms of fire intensity and frequency (Brooks, 1999; U.S. Geological Survey, 1999). The spread of Russian thistle (*Salsola* spp.) also increases fuel loads, adding to fire risks.

Wildfires have only recently become a major threat to Mojave Desert ecosystem functionality and biodiversity, including listed and/or otherwise sensitive plant and animal species. The Multiple Land Use Management Plan (EDAW, 1996), Section 14.1, stated, "*Wildfires are not a serious problem, even in the more heavily vegetated regions.*"

While this statement remains true in terms of the current number and size of wildfires, the threat of wildfires is increasing dramatically at the Combat Center. MCAGCC has only recently experienced significant increases in these nonnative, annual grasses, but since their spread is enhanced by disturbance, the Combat Center can expect this problem to increase significantly in the near future. The military use of pyrotechnics increases the probability of fires starting in many areas of MCAGCC. In a relatively short time MAGTFTC will face impacts to its military mission and risks to the functionality of its ecosystems due to wildfires.

The issue of wildfire control has legal implications involving federally-listed species, such as the desert tortoise[k] (Duck *et al.*, 1997). Wildfire prevention (*e.g.*, firebreak construction and maintenance) and its suppression (*e.g.*, equipment and personnel moving across open desert, firebreak construction, backburning operations) involve "take" risks. In addition, wildfire suppression creates other negative impacts on ecosystem functionality, such as soil compaction, vegetation destruction, and the creation of trails that can lead to increased, long-term human impacts.

3.1 MCAGCC Goals and Objectives

Wildfire issues are the primary responsibility of the Natural Resources and Environmental Affairs (NREA) Division, Installations and Logistics Directorate of MAGTFTC. MAGTFTC general goals and objectives relative to natural resources management are described in Section 1.2.1 of the INRMP. Pertinent goals and objectives relative to the prevention and suppression of wildfires include:

Goal 1. Provide quality natural resources as a critical training asset upon which to accomplish the military mission at MCAGCC.

Objective 1. Ensure no-net-loss in the capability of installation lands to support existing and projected military training and operations at MCAGCC.

Goal 2. Comply with laws and regulations that pertain to management of the Combat Center natural resources.

Objective 1. Manage natural resources within the spirit and letter of environmental laws, particularly the Sikes Act upon which this INRMP is predicated.

Objective 2. Protect, restore, and manage sensitive species and wet areas.

Objective 6 (in INRMP). Protect and manage threatened and endangered species and critical habitat in accordance with the Endangered Species Act, Marine Corps Order P5090.2A, DoD Directive 4715.3, USFWS regulations and agreements, and other applicable laws or guidance from higher headquarters. Consider species listed by the State of California.

Goal 3. Manage natural resources at the Combat Center to assure good stewardship of public lands entrusted to the care of the Marine Corps.

Objective 1. Use adaptive ecosystem management strategies to protect, conserve, and enhance native fauna and

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[k] Duck, T., T. Esque, and T. Hughes. *Fighting Wildfire in Desert Tortoise Habitat: Considerations for Land Managers*. Presentation for BLM firefighters.

flora.

Objective 2. Monitor and manage soils, water, vegetation, and wildlife at the Combat Center with a consideration for all biological communities and human values associated with these resources.

Objective 3. Participate in regional ecosystem initiatives.

3.2 Impacts

3.2.1 Military Mission

Currently, wildfire impacts to MAGTFTC's military mission accomplishment are minimal. As the risk of wildfires, in terms of both frequency and scope, increase, at least four types of threats to mission accomplishment are possible:

- the diversion of mission activities due to risks of personal safety;
- the potential requirement to interrupt training for wildfire suppression activities,
- the loss of concealment due to loss of vegetation; and
- the potential federal listing of rare plants on the Combat Center due to their losses from wildfires.

All of the above are experienced at many military installations in the United States, some with significant impacts to military mission accomplishment.

3.2.2 Ecosystem Functionality and Sensitive Species

Section 3.0 summarizes the feedback mechanism of nonnative annual grass and shrub invasion increasing the risk of wildfires; ensuing wildfires increasing the spread of nonnative annual grasses and shrubs further increasing wildfire risks. This cycle directly affects biodiversity and ecosystem functionality.

Non-native grasses and shrubs directly compete with native biodiversity, and wildfire exacerbates this biodiversity loss. At highest risk are plant species with very limited distribution and high susceptibility to disturbance or loss from fire, including many California Native Plant Society-listed plants at MCAGCC (INRMP Section 3.12.5). The loss of plants in these categories could lead to federal listing and significant protection and management requirement by MAGTFTC.

The Mojave Desert has evolved over millennia in the relative absence of significant wildfires. The increasing cycle of non-native plant invasion-wildfire occurrence/intensity requires sound wildfire management plans and practices to mitigate the significant wildfire threat to this particularly vulnerable ecosystem.

4.0 Planning

MAGTFTC will organize and implement a Wildfire Management Committee. This committee will have responsibility for developing, updating, and ensuring implementation of this Wildfire Management Plan. The committee will be composed of representatives of the Installations and Logistics Directorate (particularly NREA and the Fire Department), Operations and Training (O&T) Directorate (particularly Range Operations), and other appropriate MAGTFTC organizations. The committee will be chaired by the Director, Installations and Logistics. The committee will include representatives of the City of Twentynine Palms and County of San

Bernardino as well as the Bureau of Land Management (BLM) and National Park Service.

5.0 Wildfire Impacts and Risk Monitoring

MAGTFTC will develop means to monitor wildfire occurrences and risks during 2002-2006. Boundaries of known wildfires within the Combat Center will be delineated with global positioning systems. NREA will investigate the use of aerial photography and/or other remote sensing to delineate burn areas. NREA will also develop means to monitor changing wildfire risks and portray these risks spatially on a geographic information system.

6.0 Wildfire Prevention

The obvious avenue to wildfire prevention is stopping or slowing the invasion of nonnative annual grasses throughout the Combat Center. This course of action is also supported by Executive Order 13112, *Invasive Species*. This strategy is being investigated by federal agencies throughout the Mojave Desert, and MAGTFTC is supportive of these efforts. However, the short-term outlook is for the increasing spread of these grasses, and thus wildfire fuel loads. Thus, the MAGTFTC-specific emphasis will be on direct prevention of wildfires, rather than fuel load reduction.

During 2002-2006 MAGTFTC will investigate the use of firebreaks (bare ground) or fuel breaks (vegetation removal only) as a means to prevent the spread of wildfires. Issues that will be considered include:

- impacts on federally-listed or other sensitive plant and wildlife species,
- soil disturbance impacts,
- increased encroachment access,
- nonnative invasive plant encroachment,
- uses of herbicides,
- costs, and
- benefits in terms of fire impact minimization.

Areas that will be first evaluated for the use of firebreaks or fuelbreaks are those where risks are highest in terms of fire potential and ecological/military mission impacts. For example, Sand Hill Training Area has a relatively high fire risk due to a higher than normal plant density and a location where trespass is more prevalent than in more remote areas. This area is also very valuable desert tortoise habitat, adding an ecological value component to the prioritization process.

MAGTFTC will use its mission awareness project (INRMP Section 5.2.1) to emphasize prevention and reporting of wildfires. MAGTFTC will continue to attempt to minimize trespass, which should reduce the potential for accidental or deliberate setting of wildfires, particularly near Combat Center boundaries.

7.0 Wildfire Suppression

The Combat Center has virtually no experience with wildfire suppression, particularly in remote locations. The Combat Center firefighting system emphasizes structural fires. There is a lack of specialized equipment and personnel to work remote areas of the Combat Center. MAGTFTC must begin to resolve these shortfalls before growing wildfire risks become unacceptable.

7.1 Training

BLM has considerable experience in training fire suppression personnel for suppression of wildfires in the Mojave Desert, particularly emphasizing responsibilities for the protection of sensitive species, particularly the desert tortoise. Personnel must be trained to effectively suppress wildfires with the following additional considerations (modified from Duck *et al.*, 1997):

- vehicles can create tracks that usually become trails, adding to trespass issues and tortoise mortality associated with off-road vehicle activities;
- suppression vehicles can directly kill tortoises or crush burrows with nests or tortoises ("take");
- suppression activities can disturb or destroy important habitats or sensitive plant species and communities;
- backburning is ecologically risky because it feeds the wildfire-grass invasion cycle and disturbs habitat;
- suppression firebreaks are ecological risks in terms of cost:benefits of wildfire control;
- firefighting logistics camps and airstrips can impact tortoises and their habitats or other sensitive plant species and communities; and
- firefighting can affect the continued accomplishment of ongoing or scheduled military activities.

In addition to the above list, fire suppression personnel must be cognizant of locations of known cultural resources and requirements to protect known cultural resources and potential cultural resources in unsurveyed terrain.

MAGTFTC will coordinate with BLM for the training of fire crews and fire suppression support personnel. NREA personnel will be trained to both suppress wildfires and support wildfire suppression efforts with regard to the protection of sensitive or legally-protected biological resources.

7.2 Suppression

Suppression responsibilities will be determined by 2002.

7.2.1 Reporting

Suppression begins with wildfire reporting. Military units training on the Combat Center will be required to report wildfires as soon as they are observed. This requirement will be recommended for inclusion of CCO 5090.1B. NREA and Range Control will develop procedures for notification of appropriate suppression organizations with regard to wildfires.

7.2.2 No-fight Wildfire Areas

O&T and NREA will develop a map of areas where entry for wildfire suppression is forbidden due to the presence of sensitive, unexploded ordnance. The issue of determining personnel risks of firefighting in areas with unexploded ordnance is significant considering that much of the Combat Center has been used for explosives ordnance impact through the years. This issue is common at other military installations, and some compromise between absolute assurance of no unexploded ordnance and obvious ordnance risks is generally used to develop "no-fight" fire areas. MAGTFTC has successfully determined areas where troops can maneuver, which could be used as an index to developing "no-fight" wildfire areas.

7.2.3 Response Policy

The MAGTFTC wildfire response policy is that all wildfires will be reported, regularly checked by training units or Range Control/NREA personnel, and actively suppressed if there is significant chance of spreading beyond the initial point of ignition in areas where fire suppression is permitted. This policy will be implemented through changes in CCO 5090.1B, Marine briefings, environmental awareness materials, and other chain-of-command procedures.

7.2.4 Suppression Activities

Wildfire suppression activities will take into consideration issues listed in Section 6.1, *Training*. Suppression activities, including logistics support, will include the following considerations, whenever feasible:

- the use of Main Supply Routes and established trails as much as possible;
- avoidance of the use of the same off-road routes to avoid inadvertent trail designation;
- maximum use of Predesignated Range Training Support Sites for logistics camps;
- use of NREA personnel to minimize accidental "take" and loss of other sensitive biological or cultural resources;
- the use of backburning or firebreaks/fuelbreaks only when coordinated with NREA to minimize accidental "take" and loss of other sensitive biological or cultural resources;
- enforcement of speed limits imposed on military activities for the protection of desert tortoises;
- minimal, if any, "burning out" of unburned patches as these normally present minimal risks of flare-ups;
- the use of foot suppression over vehicles, whenever feasible; and
- strict coordination of suppression activities with Range Control and a consideration of ongoing military training.

These and other suppression considerations will be developed into training programs.

7.2.5 Interagency Coordination

MAGTFTC will coordinate with its neighboring agencies and municipalities to develop mutual aid agreements for the prevention and suppression of wildfires.

8.0 Implementation

The INRMP is the vehicle for implementing this Wildfire Management Plan. Wildfire issues are discussed in the INRMP (Section 4.12, *Wildfire Management*; Section 5.2.1, *Mission Awareness*; and Section 7.5.2, *INRMP Project Funding*). The following project with its goals and objectives is specifically included for implementation:

Project: Wildfire Management
Driver: Compliance with Executive Order 13112, *Invasive Species*; Compliance with Endangered Species Act; Compliance with Sikes Act (capability of lands to support military mission); Stewardship
Funding Priority: Highest
Project Timing: Objectives 3 and 5 - by 2001; Objective 6 - by 2005; Other objectives - ongoing indefinitely
Regulatory Approvals: U.S. Fish and Wildlife Service (desert tortoise implications only)

Vehicle for Project Implementation: In-house and other agencies
Success Monitoring: Completion of objectives

Goal. Prevent and suppress wildfires to maintain ecosystem biodiversity and functionality.

Objective 1. Continue to develop and implement this Wildfire Management Plan for MAGTFTC as fire risks, prevention/suppression, and post burn treatment options are better identified.

Objective 2. Require all military units and other installation personnel to report wildfires as soon as possible.

Objective 3. Use BLM fire management personnel to train MAGTFTC personnel in wildfire suppression techniques, consistent with protection of the desert tortoise and other sensitive biological and cultural resources.

Objective 4. Respond to wildfires as soon as possible and begin immediate suppression, consistent with safety related to unexploded ordnance.

Objective 5. Incorporate burn areas as a GIS data layer for fire effects monitoring.

Objective 6. Develop means to include wildfire risk assessments in installation monitoring programs.

Objective 7. Investigate the potential value and costs associated with the establishment of firebreaks around high risk areas.

Objective 8. Evaluate methods for treatment of burned areas to reduce invasion by exotic species.

Objective 9. Use the mission awareness project (Section 5.2.1) to emphasize wildfire prevention and reporting.

Objective 10. Provide support to the Fire Subcommittee of the Desert Managers Group and coordinate with other Mojave Desert agencies regarding wildfire prevention/suppression.

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APPENDIX 7.4: List of INRMP Goals and Objectives

The below list of **projects** with their ***goals*** and objectives is presented in the order they appear in this INRMP. Goals and objectives are summarized; their full terminology is within Chapters 4, 5, and 7.

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
4.1.1	**Ecosystem Management Coordination**						
	1. Use coordinated planning to manage natural resources to sustain the military training capability						
	1. Coordinate natural resources planning with military mission planning	x					
	2. Participate in regional planning						
	1. Support regional planning and programs	x					
	2. Provide input to regional Mojave Desert initiatives	x					
	3. Support military regional planning	x					
4.1.2	**INRMP Review and Update**						
	Maintain the INRMP process to plan and integrate natural resources management						
	1.Review this INRMP annually, and if needed, coordinate changes with the USFWS and CDFG		x	x	x	x	x
	2. Update this INRMP within five years						x
4.4.1	**Flora Inventory and Monitoring**						
	Inventory flora and monitor species/communities						
	1. Update the flora inventory	x					
	2. Develop/maintain a computerized plant checklist	x					
	3. Update vegetation map				x		
	4. Work with NASA and SERDP to efficiently use remote sensing to monitor changes in vegetation	uncertain					
4.4.2	**Habitat Management**						
	1. Utilize landscape level planning to alter limiting factors and promote priority endemic species ***2. Base species management priorities on conservation needs***						

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	1. Support the maintenance of the two guzzlers	x					
	2. Evaluate modifying guzzlers to accommodate bats and other species			x			
	3. Maintain healthy xeroriparian washes and canyons	x					
	4. Conserve bat foraging habitat	x					
4.5.2	**General Wildlife Inventory and Monitoring**						
	Inventory faunal resources and monitor species						
	1. Repeat bat survey using state-of-the-art acoustical analysis technology			x			
	2. Add to small mammal baseline inventory, emphasizing the pallid San Diego pocket mouse	x					
	3. Monitor the bighorn sheep population					x	
	4.Monitor the use of natural and artificial water sources by large mammals						x
	5. Map locations of xeroriparian washes and canyons and note their relative condition						x
	6. Inventory burrowing owl populations; monitor nesting success						x
	7. Add to the avian baseline inventory	x					
	8. Monitor amphibian populations at water sources	x					
	9. Identify potential Mojave fringe-toed lizard habitat; inventory potential habitat; determine their distribution and relative abundance; monitor populations and habitat condition; protect populations from excessive off-road vehicle use	x					
	10. Develop long-term monitoring protocols for reptiles over a broad range of conditions	uncertain					
	11. Survey for the chuckwalla and determine its Combat Center distribution.			x			
	12. Add to the amphibian/reptile inventory						x
	13. Determine fairy shrimp species composition and distribution		x				

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	14. Inventory terrestrial invertebrates to determine species composition and distribution		x	x			
4.5.3	**General Wildlife Management**						
	Consider State-protected and other nonfederally-listed species in MAGTFTC actions						
	1. Minimize Mojave fringe-toed lizard mortality and injury during off-road vehicle use	x					
	2. Give consideration to State-protected species and raptors in all Marine Corps actions	x					
	3. Protect all species listed by any federal or state law from illegal harvest	x					
	4. Discourage personnel from collecting reptiles	x					
	5. Rehabilitate injured wildlife, particularly species protected by federal law.	x					
	6. Use results of bighorn sheep surveys to determine management needs for this species.	x					
4.5.4.3	**Federally-listed Species Management**						
	General ***1. Comply with the Endangered Species Act*** ***2. Inventory fauna and monitor ecosystem indicator species***						
	1. Survey for federally-listed species and develop monitoring procedures	x					
	2. Develop inventory/monitoring for newly-listed or newly-found federally-listed species	x					
	Desert Tortoise ***1. Evaluate known and potential desert tortoise habitat***						
	1. Inventory desert tortoise-related habitat condition and health.	x					
	2. Identify at risk areas for desert tortoise habitat.	x					
	2. Monitor long-term tortoise population trends on the Combat Center						
	1. Maintain established tortoise study plots	x					

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	2. Long-term monitor desert tortoises on study plots on a 2-4-year rotational basis	x					
	3. Initiate long-term tortoise density and trend monitoring program	x					
	4. Establish/conduct transects in combination with those in Ord/Rodman Critical Habitat	x					
	3. Cooperate with research on Upper Respiratory Tract Disease						
	1. Cooperate with research on Upper Respiratory Tract Disease	x					
	2. Cooperate for the development of an "in-the-field ELISA Test"	x					
	3. Monitor tortoise health every 2-4 years	x					
	4. Protect and improve desert tortoise habitats and move toward increasing tortoise population growth ***5. Minimize injury and mortality of desert tortoises***						
	1. Implement Reasonable and Prudent Measures of the Biological Opinion, once received	x					
	2. Implement Conservation Measures of the Biological Opinion, once received	x					
	3. Maintain the study plots	x					
	4. Continue non-native predator management regarding the desert tortoise	x					
	5. Minimize road proliferation	x					
	6. Implement tortoise-related awareness programs	x					
4.6	**Wet Areas Management**						
	Manage wet areas to protect their significance to ecosystem functionality						
	1. Avoid off-road vehicle use of wet playas	x					
	2. Evaluate the boundary trench and berm on Emerson Lake						x
	3. Design tank traps to maintain natural water flow	x					
	4. Repair disturbed washes	x					

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	5. Update GIS database if new seeps or springs are discovered	x					
	6. Remove exotic, invasive species, and maintain native vegetation around man-made bodies of water	x					
4.9.1	**Training Land Monitoring**						
	Provide long-term assessments of changes in the condition of training lands at MCAGCC						
	1. Evaluate cost:benefits of repeating the LCTA program in 2009						x
	2. Consider the use of LCTA technology for special, site-specific monitoring uses	x					
	3. Evaluate the Land Use Compatibility Model to support military training	x					
	4. Evaluate Land Use Compatibility Model methodology for determining military mission impacts	x					
	5. Obtain aerial photographs and analyze for changes in disturbance compared to 1952/1997				x		
	6. Incorporate training activity data (from Land Use Compatibility Model and Range Control) to link vegetation and disturbance change to known military impacts	x					
	7. Explore new remote sensing technology for application at the Combat Center to improve the cost:benefits of monitoring training land condition	x					
4.9.2	**Training Land Management**						
	1. Coordinate with training organizations to minimize disturbance to training lands and natural and cultural resources and when justified and cost effective, restore training lands						
	1. Implement disturbance minimization measures	x					
	2. Emphasize disturbance minimization in mission awareness project	x					
	3. Concentrate damaging military activities onto lands already degraded	x					
	4. Use disturbed lands for facility development	x					

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	5. Maintain Predesignated Range Training Support Sites and other areas of concentrated military use	x					
	6. Create additional Predesignated Range Training Support Sites	x					
	7. Enhance roads, encourage their use, and avoid significant impacts to the desert tortoise	x					
	8.Evaluate flash flood risks to roads due to vegetation loss and soil compaction						x
	9. Evaluate land restoration projects on a case-by-case basis	x					
	10. Emphasize native species during land restoration; replace exotic invasive species	x					
	11. Use experience gained to improve the design and implementation of restoration projects	x					
	12. Use and maintain a uniform marking system	x					
	13. Obtain approval for military access across BLM lands	x					
	2. Use soil parameters to manage military activities, protect soil stability, restore training lands, and conserve wildlife habitat						
	14. Use site-specific soil testing for natural resources programs	x					
	15. Use soil data to make decisions	x					
	16. Develop and refine a monitoring system for determining on-base wind erosion impacts						x
4.10	**Grounds Management Support**						
	Maintain a Mainside landscape that maintains natural ecosystem functions						
	1. Develop a native plants landscaping plan and consolidate approved plant lists into an updated Base Exterior Architecture Plan						x
	2. Incorporate the Base Exterior Architecture Plan into the Comprehensive Development Plan						x

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	3. Comply with ecosystem management concepts, the Presidential directive, Executive Order 13112, and future mandates for grounds maintenance	x					
	4. Guide grounds landscaping and maintenance to use native species and drought-tolerant species	x					
	5. Continue to improve water conservation	x					
	6. Emphasize that construction funding includes long-term landscaping	x					
4.11	**Pest Management Support**						
	Control those plant and animal species that affect natural resources management or directly affect the military mission						
	1. Support the Pest Management Plan	x					
	2. Respond to requirements for animal control	x					
	3. Support sanitation procedures to reduce the attractiveness of Mainside to ravens, coyotes, etc.	x					
	4. Educate personnel about the importance of proper disposal of unused food and other refuse	x					
	5. Evaluate means to control feral and stray dogs		x				
	6. Control Africanized bees and fire ants	x					
	7. Remove invasive saltcedar	x					
	8. Control Russian thistle	x					
	9. Maintain Pest Management Plan	x					
	10. Emphasize integrated pest management	x					
	11. Ensure pesticide applicators are fully certified	x					
4.12	**Wildfire Management**						
	Prevent and suppress wildfires to maintain ecosystem biodiversity and functionality						
	1. Continue to develop and implement the fire management plan	x					
	2. Require personnel to report wildfires	x					

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	3. Respond to wildfires as soon as possible	x					
	4. Incorporate burn areas as a GIS data layer		x				
	5. Make wildfire risk assessments						x
	6. Evaluate methods to treat burned areas to reduce invasion by exotic species	x					
	7. Use the mission awareness project to emphasize wildfire prevention and reporting	x					
4.13	**Special Interest Area Protection**						
	Protect areas of special ecological concern						
	1. Use project review and the NEPA process to protect special interest areas	x					
	2. Use GIS to identify areas of special interest	x					
	3. Use the NEPA process to minimize/mitigate floodplain impacts	x					
	4. Continue to protect lava tubes and mines	x					
5.1.3	**Natural Resources Enforcement**						
	Assure compliance of military and civilian activities with regard to natural resources						
	1. Maintain a natural resources enforcement program	x					
	2. Coordinate natural resources enforcement with other agencies	x					
5.2.1	**Mission Awareness**						
	1. Develop an awareness of values/requirements for natural/cultural resources protection to sustain military training ***2. Educate military users to minimize impacts to the land and natural resources***						
	1. Revise mission awareness materials	x					
	2. Provide mission briefings to military personnel training at the Combat Center	x					
	3. Develop new materials and briefings	x					
	4. Emphasize wildfire prevention and reporting	x					

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	5. Increase awareness of the desert tortoise/habitat	x					
	6. Evaluate incorporating personnel safety into mission awareness materials		x				
5.2.2	**Public Awareness**						
	Provide information to MAGTFTC and external interested communities						
	1. Improve the general program knowledge of persons within Natural Resources Branch	x					
	2. Use key persons to support MAGTFTC conservation programs	x					
	3. Provide prepared talks	x					
	4. Use newspapers, television, and radio to inform the Twentynine Palms-MAGTFTC community	x					
	5. Use Channel 6 to reach the MAGTFTC local community	x					
	6. Update natural resources information on the MAGTFTC website	x					
	7. Consider innovative uses of MAGTFTC website	x					
	8. Participate in Earth Day; evaluate other events	x					
	9. Maintain the watchable wildlife area and evaluate other opportunities	x					
5.3.3	**Outdoor Recreation**						
	Provide outdoor recreation opportunities						
	1. Continue policies toward public access for outdoor recreation	x					
	2. Maintain and improve the interpretative trail	x					
5.4.3	**Cultural Resources Protection**						
	Implement this INRMP in a manner consistent with the protection of cultural resources						
	1. Implement provisions of the Integrated Cultural Resources Management Plan that relate to natural resources management	x					

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	2. Consider natural resources projects when planning cultural resources surveys; use cultural resources surveys to plan natural resources projects	x					
	3. Avoid/mitigate adverse effects to cultural resources from natural resources	x					
	4. Use GIS archeological information in planning and implementing ground-disturbing projects	x					
	5. Take protective measures upon site discovery	x					
	6. Use natural resources projects to protect cultural resources	x					
5.5.3	**Use of NEPA**						
	1. Use NEPA to identify projects and activities that might impact natural resources and work with project planners ***2. Use NEPA to ensure this INRMP is documented according to the spirit and letter of NEPA*** ***3. Help MAGTFTC comply with NEPA***						
	1. Document effects of INRMP implementation using an embedded environmental assessment	x					
	2. Reference this INRMP/EA in descriptions of affected environments	x					
	3. Classify mitigation as a "must fund"	x					
7.2.1	**INRMP Implementation Staffing**						
	Provide staffing to implement this INRMP						
	1. Provide staffing for the MAGTFTC natural resources program as indicated in Section 7.2.1	x					
7.2.2	**Personnel Training**						
	1. Provide training to natural resources personnel ***2. Disseminate knowledge gained at the Combat Center***						
	1. Encourage NREA natural resources personnel to join professional societies	x					
	2. Attend workshops or professional conferences	x					

Section	Projects/Goals/Objectives*	Implementation Year					
		On-going	02	03	04	05	06
	3. Evaluate other conferences/workshops; send personnel to those most justified	x					
	4. Obtain one-time or occasional refresher training needed to fulfill job requirements	x					
7.3	**Data Storage, Retrieval, and Analysis**						
	Store, analyze, and use data is an efficient, cost-effective manner						
	1. Upgrade microcomputer hardware and software	x					
	2. Develop or obtain databases	x					
	3. Provide databases to regional initiatives, etc.	x					
	4. Attach tabular data to spatial data layers	x					
	5. Provide GIS to NREA personnel	x					
	6. Use analytical capabilities of GIS	x					
	7. Create user-friendly interfaces	x					
	8. Update/replace GIS hardware/ software	x					
	9. Use remote imagery	x					
	10. Obtain color, digital orthophotographs						x

* Project title (in **bold**) follows section number; ***bold/italics*** indicate goal(s); objectives are numbered consecutively following goals. Both goals and objectives are condensed from chapters 4, 5, and 7.

APPENDIX 8.4.1: Record of Non-Applicability, Clean Air Act

Department of Defense

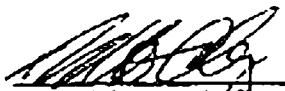
Department of the Navy

Record of Non-Applicability

Marine Air Ground Task Force Training Command (MAGTFTC)
Twentynine Palms, California
Integrated Natural Resources Management Plan

Pursuant to Section 176 (c) of the Clean Air Act, as amended by the 1990 amendments; the General Conformity Rule at 40 CFR Parts 51 and 93; and the Chief of Naval Operations Interim Guidance on Compliance with the Clean Air Act Conformity Rule, the Department of Navy (DON) determined that the MAGTFTC's Twentynine Palms Integrated Natural Resources Management Plan (INRMP) is exempt from conformity requirements. The finding is based on 40 C.F.R. § 51.853 (c) (1) which states that a conformity determination is not required for "Actions where the total of direct and indirect emissions are below the emissions levels specified in paragraph (b) of this section." The emissions levels in 40 C.F.R. § 51.853 paragraph (b), which are applicable to the MAGTFTC Twentynine Palms location are 25 tons/year for volatile organic compounds (VOCs), 25 tons/year for nitrogen oxides (NOx), and 100 tons/year of for particulate matter of ten microns or less (PM_{10}).

Analysis of the proposed action has demonstrated that the project is exempt from the conformity determination requirements of the Environmental Protection Agency's conformity rule. To the best of my knowledge, the information contained in the DON's applicability analysis is correct and accurate and I concur in the finding that air emissions associated with the proposed action are below de minimis levels, are not regionally significant, and therefore do not require further conformity analysis or determination.



19 Jul 01

B. W. SODERBERG
Head, NREA Division
Installations & Logistics Directorate
Marine Air Ground Task Force Training Command
Twentynine Palms, California

Date

Exhibit A–3. INRMP Update Report

Use this INRMP update report, along with the INRMP master update list (see Exhibit A–2), to keep your INRMP current. For an electronic copy of this form in Microsoft Word, go to http://www.denix.osd.mil/INRMP.

Complete this form electronically or in hard copy, and insert into the INRMP. Consolidate forms from each staff member when completing annual or 5-year INRMP updates.

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Prepared by Rhys Evans, NREA Division, MAGTFTC

Type of Update:
- ☒ ***Supplement*** **Existing Project or Action**
- ☐ ***Remove*** **Existing Project or Action**
- ☐ ***Create*** **New Project or Action**

1. Project or action.

Integrate provisions and requirements of Biological Opinion 1-8-99-F-41, dated 7 March 2002 into Integrated Natural Resources Management Plan.

2. Goal / objective for the project or action.

Integrate provisions and requirements of Biological Opinion 1-8-99-F-41, dated 7 March 2002 into Integrated Natural Resources Management Plan.

3. Related projects. List relevant INRMP sections and pages. Indicate if these projects are contingent on completion of project or action listed in 1 above.

Section 4.5.4, pages 88-97

4. Anticipated start / end dates. Indicate whether one-time (e.g., survey) or routine (e.g., monitoring).

Routine, start date 7 March 2002, no end date.

5. Resources needed. **All resources were identified in the INRMP**

Initial Costs (+) / Savings (-): $ **N/A**	Yearly Costs (+) / Savings (-): $ **N/A**	
Installation Labor: **N/A** hours	Volunteer Labor: **N/A** hours	Contractor Labor: **N/A** hours

Equipment: **N/A**

Training: **N/A**

IT/Information Management: **N/A**

6. Coordination requirements. Include estimated timeline/schedule.

Installation Offices/Programs: None

Local Authorities: None

State Agencies: None

Federal Agencies: U.S. Fish and Wildlife Service concurrence, estimated 1 September, 2002.

7. Compliance requirements. List appropriate regulations, documentation, permits.

Service/Installation: None

State: None

Federal: All were identified in the INRMP

8. Briefly describe reason for update.

"Biological Opinion for the Base-Wide Training Operations and Routine Maintenance Program…" had not been completed at the time MAGTFTC's INRMP was in final stages of completion. It was mutually agreed that the guidance in the BO, if significantly different from the "Interim Guidelines," would be integrated into the INRMP at the earliest possible date.

UNITED STATES MARINE CORPS
COMMANDING GENERAL
MARINE AIR GROUND TASK FORCE TRAINING COMMAND
MARINE CORPS AIR GROUND COMBAT CENTER
BOX 788100
TWENTYNINE PALMS, CALIFORNIA 92278-8100

5090.21
9/2236

United States Fish and Wildlife Service
California – Nevada Operations Office
Attn: Debra Schlaffmann
Federal Building
2800 Cottage Way, Room W-2606
Sacramento, California 95825-1846

Dear Ms. Schlaffmann,

Last year, in accordance with the Sikes Act Improvement Act, the United States Marine Corps provided your office (as well as the Portland Region 1 Office and the California Department of Fish and Game) a copy of the draft Integrated Natural Resources Management Plan (INRMP) for the Marine Air Ground Task Force Training Command (MAGTFTC) in Twentynine Palms, California. As you know, Congress mandated a deadline of November 17, 2001 for all INRMPs. For that reason, a draft was first provided to the USFWS Barstow Sub-Office on May 2, 2001. Based upon guidance we received at a later date, a copy of the plan was sent to your office on October 17, 2001. Both a draft and a final draft were made available for 30-day public review. The California Department of Fish and Game reviewed and endorsed the INRMP on November 13, 2001.

Last year, MAGTFTC was in our third year of formal Section 7 consultation with the Ventura field office, in regards to our Base-Wide Training Operations and Routine Maintenance Program. During a telephone conversation (in October of 2001) between your office and Dr. Marie Cottrell of my staff, MAGTFTC was informed that USFWS would not be able to complete review and coordination with the Marine Corps until that consultation was completed and a Biological Opinion (B.O.) was received. I am pleased to inform you that the MAGTFTC was issued a "non-jeopardy" B.O. (1-8-99-F-41) in March of this year.

I have enclosed an additional copy of our INRMP and a copy of the B.O., as well as documentation substantiating our intent to fully integrate that B.O. into our INRMP. I have also enclosed an "endorsement" page, on which we request a concurrence signature. That page should then be returned to us. We appreciate your patience in this process, and anticipate your concurrence.

My Point of Contact on this matter is Natural Resources Officer Mr. Roy Madden, who can be reached at (760) 830-7396 x234 or by electronic mail <maddenre@29palms.usmc.mil>.

B. W. Soderberg
By direction

Exhibit A–3. INRMP Update Report

Use this INRMP update report, along with the INRMP master update list (see Exhibit A–2), to keep your INRMP current. For an electronic copy of this form in Microsoft Word, go to http://www.denix.osd.mil/INRMP.

Complete this form electronically or in hard copy, and insert into the INRMP. Consolidate forms from each staff member when completing annual or 5-year INRMP updates.

Report Number 2002-3
INRMP Section 3.13 **, Page** 66
Prepared by R. Evans

Type of Update:
- ☑ ***Supplement*** **Existing Project or Action**
- ☐ ***Remove*** **Existing Project or Action**
- ☐ ***Create*** **New Project or Action**

1. Project or action.

Add as appendix 3.13 a letter to the United States Fish and Wildlife Service detailing projects MAGTFTC has completed and routine actions that demonstrate compliance with the Migratory Bird Treaty Act.

2. Goal / objective for the project or action.

Meet requirements of the Regional Internal Review Procedures memorandum by the USFWS California/Nevada Operations Office, dated 31 July, 2001.

3. Related projects. List relevant INRMP sections and pages. Indicate if these projects are contingent on completion of project or action listed in 1 above.

INRMP Section 3.13.2

4. Anticipated start / end dates. Indicate whether one-time (e.g., survey) or routine (e.g., monitoring).

Start date for this amendment is 15 August, 2002. No end date.

5. Resources needed. **All necessary costs were identified within the INRMP.**

Initial Costs (+) / Savings (-): $ **N/A**	Yearly Costs (+) / Savings (-): $ **N/A**	
Installation Labor**: Annual report to Migratory Bird Permit Office, Portland OR 4 hours**	Volunteer Labor: **N/A** hours	Contractor Labor: **N/A** hours

Equipment: **May include requirement for additional supplies.**

Training: **Continuation of training for new personnel in MBTA compliance, humane/safe wildlife capture techniques, etc.**

IT/Information Management: **Continued efforts to expand database and other records of habitat utilization, species diversity and density.**

6. Coordination requirements. Include estimated timeline/schedule.

Installation Offices/Programs: **None**

Local Authorities: **None**

State Agencies: **None**

Federal Agencies: **Review and acceptance of annual report on Special Use Permit.**

7. Compliance requirements. List appropriate regulations, documentation, permits.

Service/Installation: **Combat Center Order 5090.1C Environmental Protection**

State: **None**

Federal: **Migratory Bird Treaty Act (Special Use Permit #MB053740-0), Endangered Species Act**

8. Briefly describe reason for update.

Telephone conversation with Barstow Sub-Office personnel, describing a perceived lack of information detailing compliance and other actions in support of the Migratory Bird Treaty Act.

Exhibit A–3. INRMP Update Report

Use this INRMP update report, along with the INRMP master update list (see Exhibit A–2), to keep your INRMP current. For an electronic copy of this form in Microsoft Word, go to http://www.denix.osd.mil/INRMP.

Complete this form electronically or in hard copy, and insert into the INRMP. Consolidate forms from each staff member when completing annual or 5-year INRMP updates.

Report Number 2
INRMP Section 4.10 **, Page** 112
Prepared by R. Evans

Type of Update:
- ☑ ***Supplement*** **Existing Project or Action**
- ☐ ***Remove*** **Existing Project or Action**
- ☐ ***Create*** **New Project or Action**

1. Project or action.

Add as appendix 4.10 the "Plant Materials Matrix for 29 Palms, Barstow and China Lake."

2. Goal / objective for the project or action.

Publish an official listing of plants recommended / allowed / forbidden for landscaping and other grounds management issues at the Mainside Training Area of MCAGCC.

3. Related projects. List relevant INRMP sections and pages. Indicate if these projects are contingent on completion of project or action listed in 1 above.

Memorandum of Understanding for the Mojave Weed Management Area. Relevant section: 4.10, page 112. Also related to 4.11.1.2, Plant Control.

4. Anticipated start / end dates. Indicate whether one-time (e.g., survey) or routine (e.g., monitoring).

Start Date: 15 July 2002. No end date.

5. Resources needed. All necessary costs were identified within the INRMP. Procedural change, only.

Initial Costs (+) / Savings (-): $ **N/A**	Yearly Costs (+) / Savings (-): $ **N/A**	
Installation Labor: **N/A** hours	Volunteer Labor: **N/A** hours	Contractor Labor: **N/A** hours
Equipment: **N/A**		
Training: **N/A**		
IT/Information Management: **N/A**		

6. Coordination requirements. Include estimated timeline/schedule.

Installation Offices/Programs: **N/A**

Local Authorities: **N/A**

State Agencies: **N/A**

Federal Agencies: **N/A**

7. Compliance requirements. List appropriate regulations, documentation, permits.

Service/Installation: **N/A**

State: **N/A**

Federal: **N/A**

8. Briefly describe reason for update.

A formal listing of plants allowable for use as landscaping and other grounds management purposes is desired.

Appendix 4.10: Plant Materials Matrix for 29 Palms, Barstow and China Lake

1.0 Purpose. The purpose of this appendix is to incorporate a listing of plants authorized for use as landscaping, windbreaks and for other ground management purposes into the Integrated Natural Resources Management Plan. A list of plants that are not permitted is also included.

2.0 References.

- Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2801 et seq.)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)
- Executive Order 13112 (Invasive Species) February 3, 1999

3.0 Implementation. The Integrated Natural Resources Management Plan is the vehicle for implementing this requirement. Refer to sections 4.10 and 4.11.2 for additional information.

PLANT MATERIALS MATRIX FOR 29 PALMS, BARSTOW & CHINA LAKE
(Sunset Western Garden Book Zone 11)

Botanical Name	Common Name
TREES	
Acacia aneura	Mulga
Acacia rigidula	Blackbrush Acacia
Acacia schaffneri	Twisted Acacia
Acacia smalii (A. farnesiana)	Sweet Acacia
Celtis pallida	Desert Hackberry
Celtis reticulata	Canyon Hackberry
Cercidium floridum	Blue Palo Verde
Cercidum microphyllym	Foothill Palo Verde
Chilopsis linearis	Desert Willow
Fraxinus greggii	Little Leaf Ash
Fraxinus velutina	Arizona Ash
Leucaena retusa	Golden Leadball
*Opuntia biglovii	Teddybear Cactus
Pithecellobium mexicana	Mexican Ebony
Platanus wrightii	Arizona Sycamore
*Prosopis glandulosa 'torreyana'	Texas Honey Mesquite
*Prosopis juliflora	Arizona Native Mesquite
*Prosopis pubescens	Screwbean Mesquite
Quercus buckleyi	Texan Red Oak
Quercus fusiformis	Escarpment Live Oak
Quercus gambelii	Gambel Oak
Quercus muhlenbergii	Chinquapin Oak
Sambucus mexicana	Mexican Elderberry
Sophora secundiflora	Texas Mountain Laurel
Vauquelinia californica	Arizona Rosewood
Vitex agnus -castus	Monk's Pepper Tree
Washingtonia filifera	California Fan Palm
Washingtonia robusta	Mexican Fan Palm
*Yucca brevifolia	Joshua Tree
SHRUBS	
Acacia berlandieri	Guajillo
Acacia constricta	Whitethorn Acacia
*Acacia greggii	Cat Claw Acacia
*Agave americana	Century Plant
Agave colorata	NCN
Agave murpheyi	NCN
Agave parryi	NCN
Agave scabra	NCN
Ambrosia deltoidea	Triangleleaf Bursage
Ambrosia dumosa	White Bursage
Amsonia palmeri	NCN
Anisacanthus quadrifidus	NCN
Artemesia ludoviciana	Prarie Sagebrush

*Not recommended for family housing

PLANT MATERIALS MATRIX FOR 29 PALMS, BARSTOW & CHINA LAKE

SHRUBS (CONT'D)

Artemisia tridentata	Big Sagebrush
Atriplex canescens	Four Wing Saltbush
Atriplex lentiformis	Quailbush
Baccharis sarothroides (male)	Desert Broom
Baileya multiradiata	Desert Marigold
Berlandiera lyrata	Chocolate Flower
Buddleya marrubifolia	Wooly Butterfly Bush
Calliandra eriophylla	Pink Fairy Duster
Chrysactinia mexicana	Damianita
Chrysothamnus nauseosus	Rabbitbrush
Cordia parvifolia	Little-leaf Cordia
Cowania mexicana	Cliff Rose
Dalea spp.	Indigo Bush
*Dasylirion acrotriche	Green Desert Spoon
*Dasylirion wheeleri	Desert Spoon
Ephedra spp.	Mormon Tea
Ericameria laricifolia	Turpentine Bush
Eriogonum fasciculatum	Flattop Buckwheat
Eriogonum wrightii	Wright's Buckwheat
Euphorbia biglandulosa	Gopher Plant
Fallugia paradoxa	Apache Plume
*Ferocactus wislizenii	Fishook Barrel Cactus
*Fouquieria splendens	Ocotillo
Hesperaloe spp.	NCN
Hymenoxys acaulis	Angelita Daisy
Larrea tridentata	Creosote Bush
Leucophyllum frutescens	Texas Ranger
Melampodium leucanthum	Blackfoot Daisy
Mirabilis multiflora	Colorado Four O'Clock
Muhlenbergia spp.	Deer Grass
Nolina spp.	Beargrass
*Opuntia santa-rita	NCN
Penstemon spp.	NCN
Psilostrophe cooperi	Paper Flower
Psilostrophe tagentina	Paper Flower
Rhus trilobata	Three-Leaf Sumac
Salvia spp.	Sage
Simmondsia chinensis	Jojoba
Sphaeralcea ambigua	Globe Mallow
Teucrium chamaedrys	Prostrate Germander
*Yucca baccata	Datil Yucca
Yucca elata	Soaptree Yucca
*Yucca schidigera	Mojave Yucca
Zephyranthes spp.	Rain Lily
Zinnia acerosa	Desert Zinnia
Zinnia grandiflora	Prarie Zinnia

PLANT MATERIALS MATRIX FOR 29 PALMS, BARSTOW & CHINA LAKE

GROUND COVER

Dyssodia acerosa	Shrubby Dogweed
Dyssodia pentachaeta	Golden Dyssodia
Oenothera stubbii	Baja Primrose

TURF (Limited to passive or active recreation areas only)

Marathon II Fescue (High-visibility areas, streetscapes, entries, family housing)

Hybrid Bermuda (Parks or ballfield areas only)

NATIVE PLANT NURSERIES

Consult the California Native Plant Society at (619) 685-7321 or (818) 881-3706 or visit http://www.lacnps.org/plants.html for a list of native plant nurseries.

PLANTS NOT PERMITTED:
Botanical Name

Acacia baileyana
Acacia longifolia (latifolia)
Acacia melanoxylon
Acacia verticillata
Ailanthus altissima
Anthemis cotula
Aptenia cordifolia
Arundo donax
Bamboo spp.
Carpobrotus edulis
Chrysanthemum coronarium
Cortederia jubata, Cortaderia selloana
Cynara cardunculus
Cynodon dactylon
Cyperus alternifolia
Cyperus rotundus
Cytisus scoparius , Cytisus striatus
Echium candicans, Echium pininana
Ehrharta calycina
Eucalyptus sp.
Foeniculum vulgare
Gazania sp.
Hedera canariensis
Limonium perezii
Myoporum laetum
Nicotania glauca

PLANTS NOT PERMITTED (cont'd):

Scientific Name

Oenothera berlandieri (O. speciosa childsii)
Pennisetum cladestinum
Pennisetum setaceum
Phalaris aquatica
Lippia nodiflora
Retama monosperma
Ricinus comminis

Rubus discolor
Senecio mikanioides
Schinus molle
Schinus terebinthifolius
Senecio mikanioides
Sorghum halepense
Spartium junceum
Tamarix spp.
Ulmus paryifolia
Vinca major

In addition, any plant listed by the California Exotic Pest Plant Council or the California Department of Agriculture as a threat to ecosystems or agriculture shall not be planted.

For more informations please contact the following websites:
http://www.caleppc.org OR http://pi.cdfa.ca.gov/weedinfo